UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Northwest Region
7600 Sand Point Way N.E., Bldg. 1
BIN C15700
Seattle, WA 98115-0070

NMFS Tracking
No.: 2003/00842

October 22, 2003

MEMORANDUM FOR: FILE

FROM: D. Robert Lohn, Regional Administrator

SUBJECT: Endangered Species Act Section 7 Consultation on NOAA Fisheries Funding for the City of Cle Elum Wastewater Treatment Relocation and Hanson Ponds Habitat Restoration Project, Kittitas, County, Washington, WRIA 39

The attached Biological Opinion, submitted for your consideration and signature, was prepared by the Washington Habitat Branch. We considered the range of expected effects that may occur during, and as a result of, installing a mainstem rock drop, relocating the City of Cle Elum wastewater outfall, reopening an abandoned channel, and constructing an inlet channel to the Hanson Ponds on the Yakima River at Cle Elum, Washington. NOAA Fisheries (through the Coastal Salmon Fund), the City of Cle Elum and the Washington State Department of Transportation are all providing funds to the Yakama Nation for the proposed construction. The Washington Habitat Branch staff has arrived at a "no jeopardy" opinion. An Incidental Take Statement is part of this Biological Opinion. This Biological Opinion has been reviewed by David Hirsh and myself. Because the magnitude of effects is expected to be small, and noncontroversial in nature, there is a negligible risk of litigation. Therefore, review by GCNW was not requested.

If you have any questions or require additional information, please invite your staff to contact Diane Driscoll at (509) 962-8911 or email at diane.driscoll@noaa.gov.

Attachments

Endangered Species Act Section 7 Consultation Biological Opinion
and
Magnuson-Stevens Fishery Conservation and Management Act
Essential Fish Habitat Consultation

City of Cle Elum Wastewater Treatment Outfall Relocation and Hanson Ponds Habitat Restoration Project
Middle Columbia River Steelhead ESU
Yakima River
Upper Yakima River Watershed
Kittitas County, Washington
WRIA 39

Lead Action Agency: National Marine Fisheries Service

Consultation Conducted By: National Marine Fisheries Service
Northwest Region

Date Issued: October 22, 2003

Issued by: For Michael R Crouse

D. Robert Lohn
Regional Administrator

NMFS Tracking No.: 2003/00842

TABLE OF CONTENTS

1.0 INTRODUCTION

The Endangered Species Act (ESA) of 1973 (16 U.S.C. 1531-1544), as amended, establishes a national program for conserving threatened and endangered species of fish, wildlife, plants, and the habitat on which they depend. Section 7(a)(2) of the ESA requires Federal agencies to consult with NOAA's National Marine Fisheries Service (NOAA Fisheries) and United States Fish and Wildlife Service (together "the Services"), as appropriate, to ensure that their actions are not likely to jeopardize the continued existence of endangered or threatened species or adversely modify or destroy their designated critical habitats. This biological opinion (Opinion) is the product of an intraagency consultation pursuant to section 7(a)(2) of the ESA and implementing regulations 50 CFR 402.

The analysis also fulfills the Essential Fish Habitat (EFH) requirements under the Magnuson-Stevens Fishery Conservation and Management Act (MSA). The MSA, as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267), established procedures designed to identify, conserve, and enhance EFH for those species regulated under a Federal fisheries management plan. Federal agencies must consult with NOAA Fisheries on all actions, or proposed actions, authorized, funded, or undertaken by the agency, that may adversely affect EFH (section 305(b)(2)).

NOAA Fisheries, the City of Cle Elum (the City), and the Washington State Department of Transportation (WSDOT) propose to provide funds to the Yakama Nation (YN) for a project that will relocate the City wastewater treatment outfall, protect and stabilize the north bank of the Yakima River in the Action Area, and create roughly 83 acres of juvenile rearing habitat in Hanson Ponds One (Pond One) and Two (Pond Two). These individual activities are interrelated and interdependent and are referred to as the "project" throughout this document. The purpose of the project is to restore side channel rearing habitat for native and hatchery-reared salmonids by providing unobstructed and consistent flows from the Yakima River through the ponds and their natural outlet channel. The proposed action will occur within the geographic boundary and habitat of the threatened Middle Columbia River (MCR) steelhead (*Oncorhynchus mykiss*) Evolutionarily Significant Unit (ESU). The proposed Action Area is designated as EFH for chinook (*O. tshawytscha*) and coho (*O. kisutch*) salmon. The administrative record for this consultation is on file at the Washington Habitat Branch office.

1.1 Background Information and Consultation History

The project consists of three individual activities. The City proposes to relocate and to replace its existing wastewater treatment outfall built in 1981. The existing outfall alignment extends 1,743 feet to the Yakima River at approximately river mile (RM) 180.7. The YN proposes to restore and enhance the aquatic and riparian habitat function of the Hanson Ponds, supporting rearing habitat for juvenile chinook and coho salmon, steelhead and resident trout. The WSDOT proposes to sponsor and design a bank stability project at RM 181.2 of the Yakima River that will contribute to each of the other efforts. NOAA Fisheries received a Biological Assessment and EFH assessment (BA) on March 10, 2003. To address information needs following submittal of the BA, NOAA Fisheries attended a meeting and site visit with all concerned parties on June 30, 2003. To follow up the meeting and site visit, NOAA Fisheries received a BA addendum on July 2, 2003 and initiated formal consultation.

1.2 Description of the Proposed Action

Proposed actions are defined in the Services' consultation regulations (50 CFR 402.02) as "all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by Federal agencies in the United States or upon the high seas." In addition, United States Code (16 U.S.C. 1855(b)(2)) further defines a Federal action as "any action authorized, funded, or undertaken or proposed to be authorized, funded, or undertaken by a Federal agency." The Federal nexus is through funds for the design and construction of the ponds' restoration and enhancement that were secured through grants dispersed through NOAA Fisheries Coastal Salmon Fund Program. Because NOAA Fisheries is dispersing the funds for an action that may affect listed resources, NOAA Fisheries is required to consult under ESA section 7(a)(2) and MSA section 305(b)(2).

The proposed project involves three interrelated construction activities: (1) flood protection and Yakima River channel stabilization by construction of a rock drop structure in the reach where the City's wastewater treatment plant outfall will be relocated; (2) relocation of the existing outfall alignment to a geomorphically stable region upstream of the current location where rapid mixing of wastewater can be assured over the long long-term; and (3) creation of over 83 acres of off-channel salmonid rearing habitat within the Hanson Ponds by creating a hydraulic connection to the Yakima River and enhancing existing conditions within the ponds. NOAA Fisheries proposes to fund, in part, construction activities to build a hydrologic connection between the Yakima River and Hanson Ponds to create approximately 83 acres of juvenile rearing habitat in Hanson Ponds, south of Cle Elum, Kittitas County, Washington. The United States Corp of Engineers (COE) proposes to permit certain activities that must be accomplished in and near the water for part of the underlying construction.

The Hanson ponds are gravel borrow pits, created in the 1960's during construction of Interstate 90 (I-90). Excavated to a depth of approximately 10 feet, the ponds now fill with water from groundwater inflow and continuity with the Yakima River. The proposed construction includes a mainstem rock drop in the Yakima River to create a flow-through connection to the ponds from the river that will also provide flood protection, bank stabilization, and a geomorphically stable location for the City's wastewater outfall.

1.2.1 Yakima River Stabilization Structure and Associated Elements

The proposed alignment within the riverbed is currently a large, deep, lateral, scour pool with some back eddy hydraulics created by the force of the river into the northern bank. On the north side of the river existing trails, roads, and a parking lot will provide access, staging, and stockpile locations. Work on the south bank will require fording the river to gain equipment access and transport materials as identified in the BA. The number of trips across the ford crossing will be held to the minimum necessary to efficiently transport equipment and materials. The north bank of the river may be cut or shaped to allow equipment access to the gravel bar and ford. Equipment will travel across the riverbed and exit in a gentle manner which does not push a wave of water up on the bank, washing material into the river. If necessary to control turbidity, washed gravel or local gravel bar material with minimal fine sediments will be placed on the ford approaches.

Before any in-water construction, the area will be surveyed for spring chinook redds by Washington State Department of Fish and Wildlife (WDFW) biologists (B. Renfrow, pers. comm. 2003). According to WDFW Area Habitat Biologist Brent Renfrow (pers. comm. Sept. 2003), the area of the rock drop construction and the ford crossing are poor spawning locations and have not contained redds in past surveys. If redds are observed, they will be marked at the shoreline and measures will be taken to prevent sediment mobilized by the action from reaching any redds.

Main Rock Drop. In addition to its fundamental roles in providing flow control to the Hanson Ponds, and flood damage protection to I-90, the rock drop has been designed to (1) maintain fish passage through the rock drop stabilization structure, (2) minimize adverse environmental impacts during and after construction, and (3) provide a stable and permanent structure for protection of the City's wastewater treatment plant outfall. The main rock drop will form a weir. The weir will be constructed within the Yakima River. The weir length will be 358 feet and the maximum width (from the upstream to downstream end) within the river will be approximately 85 feet at the boat notch, and the average height will be two to three feet above the existing river bottom elevation. A boat notch will be centrally positioned in the structure. The in-water sections of the rock drop on either side of the boat notch will be approximately 25 feet in width.

An excavator will place (not dump) rock across the alignment grade. The rocks will be placed one at a time, proceeding into the channel from shore. Equipment used for construction will primarily operate on rock "platforms" as the weir is built so that it remains mostly within the wetted perimeter of the river during construction. The sequence of steps required for installation, typical of a mid-size rock drop are outlined below in section 1.2.4. Rock will average three feet in diameter. The total estimated quantity of rock required for construction within the Yakima River mainstem is 1,875 cubic yards, of which 1,720 cubic yards will be placed within the ordinary high water mark (OHWM). Required rock quantity estimates developed for each of these components are shown in Appendix A, Table 1.

River channel bed excavation will be limited to the minimum necessary to place the large rock at grade. The water surface will be raised approximately 0.6 feet at the Yakima River main rock drop. This rise will taper off upstream very rapidly, and will be compensated for by other project actions; e.g., removing the gravel plug from the abandoned south channel, and opening the inlet to Hanson Ponds.

South Bank Key. The south bank key is necessary to prevent the rock drop structure from being by-passed by end failure during high flow conditions. The south bank key of the rock drop will extend through an emergent, sedge dominated wetland, the riparian zone and up to the floodplain boundary, an area 130 feet long, 15 feet wide, and three and one-half feet deep. Three hundred thirty three cubic yards of rock will be used; 200 cubic yards will be below the OHWM. Rocks for the key will fill approximately 0.1 acre of wetland. Water ponding upstream of the rock drop will enhance other wetlands in the project area. The south bank key will be similar in construction to the north and south flanks. However, some excavation will be required to initially establish a trench for the rock placement through the south bank. The proposal is to construct the south bank key before the other elements of the rock drop, and to progress construction across the channel from this structure.

South Channel Reactivation. Removal of a gravel plug will "reactivate" the South channel to convey as much of the flow of the river as possible during construction. This activity will decrease the amount of flow during construction of the main rock drop across the north channel . Excavation of the gravel plug (approximately 1,000 cubic yards of material) will proceed upstream from the downstream end. The channel will be ready to receive the active flow of the river before the last remaining berm of material is removed from the upstream end of the plug. Temporary bulk bags and ecology blocks will direct the flow away from the north channel toward the south channel. After completion of the project, and following removal of the temporary bulk bags and ecology blocks, the south channel will continue to convey a portion of the flow of the river, which will help direct the flow towards the center of the channel and across the boat notch in the middle of the rock drop (Appendix A, Figures 3, 4, and 5). The north channel should remain the primary channel of the river following the proposed work. Inundation through the south channel will create water levels of one-half to one-foot deep. The flow-through conditions created in the south channel are conservatively estimated to result in the overall loss of not more than 0.25 acres of primarily scrub-shrub wetland vegetation. Inundation of vegetation on the fringes of the channel will enhance remaining wetlands in both function and area.

Boat Notch. After the south channel is opened, bulk bags and ecology blocks will be used to divert most of the mainstem flow away from the north channel and create a cofferdam around a large scour hole in the middle of the north channel. A boat notch will be constructed at the mid-channel location of the rock drop structure to provide passage for recreational boats, and to ensure that the City's outfall is submerged under all flow conditions. Using the existing scour hole will eliminate the need for excavation. Any turbid water that collects in this area during construction will be pumped into Hanson Pond Two since the ponds will not be connected to the river at this time. The proposed boat notch design will provide a mid-channel (i.e., north to south) gap of approximately 40 feet for the passage of boats. The "wings" on each side of the notch will concentrate water through the center. This design will create turbulence below the boat notch, yielding a highly abbreviated mixing zone required for effluent dilution (Cosmopoliton 2002). A similar boat notch design was used in a rock drop constructed roughly two miles upstream near the South Cle Elum bridge in the fall of 2000.

North and South Flank Rock Drop Alignments. The north and south flanks of the rock drop, each approximately 70 feet in length, will help stabilize the instream structures. They will be constructed with a thickness of two rocks, yielding a water surface differential of approximately one-foot above the existing water surface elevation. The width of the flanks from upstream to downstream will be approximately 25 feet. Flows will be concentrated toward the scour hole of the boat notch by placing rocks on the north and south flanks

North Bank Jetty Repair and Planting Bench. The north bank of the Yakima River, in the Action Area, has experienced substantial erosion. Immediately upstream of Hanson Ponds the north bank is a riprapped dike. In the mid-1960's WSDOT placed riprap along the north bank to shift the natural channel of the Yakima River southward for construction of I-90. In December 1999, the COE placed two rock jetties in this area to prevent a dike breach and catastrophic flooding through Hanson Ponds. The riparian zone along this section of the reach does not presently provide shade, instream cover or terrestrial contributions of organic matter.

Proposed construction in this area includes: (1) rebuilding the upstream jetty to form a barb that will redirect flow away from the bank; (2) maintaining the second jetty to divert flows and keep trash from entering Pond Two; (3) constructing a 250-foot long planting bench of the Pond Two inlet channel; (4) placing large woody debris (LWD) into the mainstem downstream of the planting bench. Trees, rock, and most of the gravel removed from the abandoned south channel (described above) will be used to construct the flattened-slope planting bench. The planting bench will help protect the failing bank and provide a location to establish vegetative cover. Elevation of the bench will range from about one to four feet above low water in the river, and all of the bench will be below the OHWM. As the hydrograph of the Yakima system is highly manipulated by Bureau of Reclamation (BOR) system operations, water levels in the river will be high during the growing season, such that areas of the bench that will lie within two feet elevation of the low water level will become wetland. The planting bench will result in the creation of approximately 0.06-acre of riparian wetland. Downstream of the planting bench, placement of additional LWD will increase nearshore mainstem habitat complexity.

Project timing for Yakima River Stabilization Structure. Work in the Yakima River mainstem to construct the rock drop stabilization structure will occur between October 15 and December 15, 2003. Once, initiated, it should take no longer than two weeks to construct the full mainstem rock drop structure.

1.2.2 Replacement of Wastewater Outfall

The replacement outfall and conveyance for treated sewage effluent will be a 24-inch diameter ductile iron or high-density polyethylene pipe. The outfall conveyance will cross under I-90 in a bored tunnel to avoid surface disruption. The bored tunnel will not affect the Yakima River or it's associated riparian area. However, from the exit of the borehole beneath I-90, the pipe trench will extend south along the embankment that forms the west end of Pond Two to the river dike near the southwest corner of Pond Two (Appendix A, Figure 2, Manhole B). Over most of its length, the effluent pipe will be placed to grade in a trench by standard cut and cover construction techniques. The pipe will be covered with at least four feet of fill. The excavated trench will be four and one-half to 12 feet wide within a 50-foot wide work zone. Shoring will be used where soil conditions or trench depths require stabilizing sidewalls. Select, clean material will be imported for use as pipe bedding material in the trench. A portion of the excavated material will be used for trench backfill after the pipe is installed. Any groundwater that enters the trench during construction will be pumped into Pond Two where sediments can settle (the pond while have no surface connection to the river at this time). Excess excavated material will be removed to an approved location where it cannot reenter the river. The pipe will be protected from scour from overland flow by placing a rock sill flush with the existing ground surface in the rock trench.

From the southwest corner of Pond Two, the outfall pipe will follow the alignment of the proposed main rock drop for protection. The estimated quantity of rock required to protect the outfall pipe south of I-90 is 580 cubic yards of material. At the upstream end of the boat notch, the outfall conveyance pipe will bend downstream and extend under the rocks to a 16-inch nozzle at the discharge point in the river immediately below the boat notch. Turbulence below the boat notch will create a plunge pool. Turbulence within this plunge pool will create an optimum mixing zone for the treated effluent, resulting in almost immediate mixing of effluent constituents.

The replacement outfall will usually function by gravity flow. Pumping through the outfall will occur when peak effluent flow periods and high Yakima River flows (near or above flood stage) coincide. Present plans are to abandon the existing 12-inch diameter outfall in place.

The outfall replacement will occur at the same time as the construction of the Yakima River Rock Drop stabilization structure described above. The actual in-water time required to construct the outfall with the north one-half of the rock drop structure will require three to four days.

1.2.3 Hanson Ponds Habitat Restoration and Enhancement

The Hanson Ponds project will re-create side channel environments. The dike breach to create the Pond Two inlet channel will establish a direct connection between the Yakima River mainstem and the ponds (Appendix A, Figures 2 and 3). A portion of the Yakima River discharge (approximately 10% of base flow) will flow through Hanson Ponds and the egress channel. The 5,300-foot long side channel will provide year round habitat and refugia for rearing juvenile salmonids.

Construction of the Hanson Ponds features described below will begin at the downstream edge of the project boundary and progress upstream. Turbidity in the ponds and in the egress channel will not affect the Yakima River because there will be no surface flows during construction. When the inlet channel is opened, the new rock drop structures and flow through the wetland downstream of Pond One will minimize any sediment mobilized initially. The inlet channel will be opened after all other activity within the ponds is completed. At the time of construction, the Yakima River will be at base flow; thus, hyporheic flow into the ponds, which occurs during high flows, will also be minimal. Construction of the Hanson Ponds habitat enhancements will require approximately one month to complete and will begin after the mainstem rock drop and outfall relocation projects are completed.

Specific work within the Ponds while isolated from the Yakima River include: (1) a stabilized inlet channel that will convey water from the Yakima River mainstem to Pond Two; (2) three breaches in the dike on the south side of the Ponds to provide flow equalization between the ponds and the Yakima River during high flows; (3) a stabilized channel between Pond One and Two; (4) grade control structures (rock drops) in the slough channel below Pond One that connects with the Yakima River mainstem; and (5) borrow pit barbs and spillway armoring within the Pond complex to convey flood flows through the off-channel system, and to reduce erosive energies that may impinge on the I-90 eastbound lanes and Cle Elum East Interchange

(Exit 85) during flood events.

Hanson Ponds Inlet Channel. The proposed project includes partially reconstructing the two existing COE in-water structures (upstream structure becomes a barb, downstream structure remains a jetty) and constructing a 220-foot long inlet channel at the southwest corner of Pond Two (Appendix A, Figure 2). The COE jetty will require 85 cubic yards of rock to function as required. Three rock drop structures will be constructed in the inlet channel between the mainstem and Pond Two to increase the stability of the inlet channel. Modification of an existing COE jetty will provide scouring at the inlet opening to retard debris and sediment accumulation. The design will direct approximately 10% of the flow of the river into Hanson Ponds at base flow. The dimensions of the rock stabilized open channel will regulate flow through the inlet channel. Cross-section dimensions will approximate a trapezoid, with two to one side slopes and a 10-foot wide channel bottom. Under ordinary non-flood, bankfull conditions such as experienced during a typical regulated flow release, the water surface elevation would be approximately one to two feet below the dike crest. The unconstrained flow through Hanson Ponds inlet channel under these bankfull conditions would approximate 250 to 350 cubic feet per second (cfs). The inlet channel and associated rock drops will need an estimated 895 cubic yards of rock to construct, 405 cubic yards of this material will be below the OHWM.

Hanson Ponds Habitat Structures. Submerged boulder clusters and LWD structures built within the ponds will provide habitat complexity and over-wintering refugia for juvenile salmonids. Wetland and riparian vegetation will be planted along pond edges, on peninsulas to be constructed within the ponds, on the proposed planting bench, and along the abandoned dike access trail, which will be converted to a pedestrian-only trail. Sections of the dike will be scarified and seeded to restore vegetative cover after compaction caused by vehicles and equipment.

Grade control features are proposed at several locations within the Hanson Ponds complex for vertical stability of the channel. Four rock drops (submerged rock weirs) will be built in the inlet channel, two rock drops between Pond One and Two, two at the outlet of Pond One, and six more in the side channel/wetland area on the downstream end of Pond One between the pond and the connection to the Yakima River (Appendix A, Figures 5 and 6). The proposed rock drops will prevent head-cutting, provide additional habitat diversity with the ponds, and help prevent the Yakima River from shifting into the Ponds.

Three breaches in the armored dike along the southern edge of the ponds will ensure that if flood flows enter the ponds, there will be an outlet for these flows to rejoin the main channel. The breaches are necessary to avoid trapping flood flows north of the dike that could damage I-90. The design elevation of the breaches was chosen to encourage development of wetland vegetation in the cuts but still allow high flows to pass. The elevation of the proposed dike breach exceeds the OHWM, but is less than the estimated 100-year flood elevation. Each breach will be approximately 200 feet long, six feet deep, and 37 feet wide. Two of the breaches will be approximately one-foot above the estimated low water levels in the ponds. Scrub-shrub wetlands are expected to develop within these two breaches. At its lowest level, the water table will be within one-foot of the top of the substrate, allowing willows to establish. This will result in a gain of roughly 0.34-acre of wetland.

The new rock drops will provide upstream fish passage through the Hanson Ponds. The water level difference across the individual rock weirs will not exceed 13 inches. Low-flow notches in the weirs will reduce the drop height to a maximum of four to six inches. These modest drops will ensure upstream access by juvenile salmonids. The total estimated quantity of rock required for construction within the Hanson Ponds complex is 2,360 cubic yards, of which 1,630 cubic yards will be below the OHWM.

1.2.4 Proposed Project Sequence

As stated previously, the existing trails, roads, and large parking lot (Appendix A, Figure 1) will provide the area needed to stockpile rock and stage equipment. There will be temporary access routes constructed on the levees and along the abandoned south channel before it is excavated and reopened. Construction for the main rock drop, the outfall relocation, and the pond inlet channel will proceed as described below:

1. Build the 130-foot long south key of the main rock drop. Move rock for the south key across the river at a designated temporary construction crossing (Appendix A, Figure 2) using off-road 25-ton capacity articulated trucks. Use temporary construction access route through dry south channel to deliver rock from stockpile north of the river (Appendix A, Figure 2). Clean up all disturbed areas near main rock drop on south side of river.

2. Excavate south channel gravel plug (approximately 1,000 cubic yards) (Appendix A, Figure 2) and haul material across river using articulated trucks. Do not excavate in active flow of river until south channel is ready to carry water. Items 1 and 2 will occur simultaneously.

3. Construct temporary truck access along existing levee to main rock drop on north side of river (Appendix A, Figure 2).

4. Install proposed manholes A and B and connect proposed sewer pipe at same time as constructing lower two-thirds of pond inlet channel between river and Pond Two. Maintain road access across pond inlet channel and do not allow river to enter pond inlet channel. Dewater the sewer pipe trench by pumping excess into Pond Two. Items 3 and 4 will be done simultaneously.

5. Divert flow at construction crossing into reactivated south channel. Use ecology blocks and bulk bags with plastic and filter cloth to temporarily reduce flow to the active north channel.

6. Build phase one of north side flank of main rock drop up to north side of boat notch (Appendix A, Figure 3). Deliver large rock as needed from rock stockpile using articulated trucks.

7. Install proposed sewer line from Manhole A to end of outfall (Appendix A, Figure 2). If necessary, use ecology blocks and bulk bags with filter cloth to control turbidity. Dirty water can be discharged into Pond Two (there will be no overland connection at this time).

8. Install planting bench to protect the sharp bend on north channel near Pond Two (figure 4).

9. Complete boat notch and cover sewer outfall line (north flank, phase two).

10. Construct south flank of main rock drop (Appendix A, Figure 3). Deliver large rock as needed from rock stockpile using articulated trucks. Clean up all disturbed areas near main rock drop on north side of river. Finish main rock drop by building north key.

11. Finish constructing and armoring the pond inlet channel into Pond Two. Also rebuild the two existing COE jetties (Appendix A, Figure 2). Convert upstream jetty into a bank barb. Keep access road over pond inlet channel until all work on Hanson's Ponds is complete.

12. Remove upper channel blocks (No. 5, above) and allow Yakima River to flow into both north and south channels.

1.3 Description of the Action Area

An Action Area is defined by the Services' regulations (50 CFR Part 402) as "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action." The proposed project is located south of the City in Kittitas County, Washington, Sections 35 and 36, Township 20 N, Range 15 E. The Action Area affected by the proposed action includes the mainstem Yakima River and its associated riparian and wetland area from approximately RM 180.7 downstream to RM 182.7, Hanson Pond One and Two, and the wetland areas (upstream and downstream) associated with the ponds. The Fifth field hydrologic unit code (HUC) encompassing the Action Area is the Upper Yakima River. This area serves as migratory corridor, spawning, and rearing habitat for MCR steelhead and EFH for the spring chinook and coho salmon.

2.0 ENDANGERED SPECIES ACT - BIOLOGICAL OPINION

The objective of this Opinion is to determine whether the City Wastewater Treatment Outfall Relocation and Hanson Ponds Habitat Restoration Project is likely to jeopardize the continued existence of the MCR steelhead ESU.

2.1 Evaluating the Effects of the Proposed Action

The standards for determining jeopardy are set forth in section 7(a)(2) of the ESA as defined by 50 CFR part 402 (the consultation regulations). NOAA Fisheries must determine whether the action is likely to jeopardize the listed species. This analysis involves the initial steps of (1) defining the biological requirements of the listed species and (2) evaluating the relevance of the environmental baseline to the species' current status.

2.1.1 Biological Requirements

The first step in the methods NOAA Fisheries uses for applying ESA section 7(a)(2) to listed salmon is to define the species' biological requirements that are most relevant to each consultation. NOAA Fisheries also considers the current status of the listed species; considering population size, trends, distribution, and genetic diversity. To assess the status of the listed species, NOAA Fisheries starts with the determinations made in its original decision to list the species for protection under the ESA. In addition, the assessment will consider any new information or data that are relevant to the determination.

The relevant biological requirements are those necessary for the listed species to survive and recover to naturally reproducing population levels when protection under the ESA would be unnecessary. Species or ESUs not needing ESA protection have the following attributes: population sizes large enough to preserve genetic diversity and heterogeneity; the ability to adapt to and survive environmental variation; and are self–sustaining in the natural environment.

The MCR steelhead biological requirements include food, flowing water (quantity), high quality water (cool, free of pollutants, high dissolved oxygen concentrations, low sediment content), clean spawning substrate, and unimpeded migratory access to and from spawning and rearing areas (adapted from Spence *et al.* 1996). The specific biological requirements affected by the proposed action include: (1) water quality (temperature, turbidity, chemical contaminants); (2) habitat access; (3) habitat elements (LWD, pool frequency, pool quality, off-channel habitat, refugia); (4) channel condition and dynamics (width/depth ratio, riverbank condition, floodplain connectivity); (5) watershed conditions (riparian habitat).

2.1.2 Status and Generalized Life History of Listed Species

The listing status and biological information for NOAA Fisheries listed species that are the subject of this consultation are described below in Table 2.

Species	Listing Status	Critical Habitat	Protective Regulations	Biological Information
Middle Columbia River steelhead	March 25, 1999, 64 FR 14517. Threatened	Not Designated[1]	July 10, 2000; 65 FR 42422	Busby, *et al.* 1996

Table 2. References to Federal Register Notices containing additional information concerning listing status, and biological information for listed and proposed species considered in this biological opinion.

The MCR steelhead, as well as other native fish stocks across the Columbia River Basin, have been negatively affected by a combination of habitat alteration and hatchery management practices. The four downstream, mainstem dams on the Columbia are perhaps the most significant source of habitat degradation for this ESU. The dams act as a partial barrier to passage, kill out-migrating smolts in their turbines, raise temperatures throughout the river system, and have created lentic refugia for salmonid predators. In addition, alterations in the structure and function of riverine systems has provided conditions that impair the physiology of salmonids and invigorate native and nonnative predators, severely truncate or remove natural spatial and temporal discharge characteristics tied to life-history requirements, and often dictate the long-term timing of immigration and emigration. In addition to dams, irrigation systems have had a major negative impact by diverting large quantities of water, stranding and/or entraining fish, and acting as barriers to passage. Other major habitat degradation has occurred through urbanization (especially in alluvial floodplains) and livestock grazing practices (WDF *et al.* 1993; Busby *et al.* 1996; 1999; NMFS 1996a).

Habitat alterations and differential habitat availability (*e.g.*, daily or annually fluctuating discharge levels) limit the production of naturally spawning populations of salmon and steelhead. The National Research Council Committee on Protection and Management of Pacific Northwest Anadromous Salmonids identified habitat problems as a primary cause of declines in wild salmon runs (NRCC 1996). Some of the habitat impacts identified were the fragmentation and loss of available spawning and rearing habitat, migration delays, degradation of water quality, removal of riparian vegetation, decline of habitat complexity, alteration of streamflow and streambank and channel morphology, alteration of ambient stream water temperatures, sedimentation, and loss of spawning gravel, pool habitat and LWD (NMFS 1996a; NRCC 1996; Bishop and Morgan 1996).

Hatchery management practices are suspected to be a major factor in the decline of this ESU. The genetic contribution of non-indigenous, hatchery stocks may have reduced the fitness of the locally adapted native fish through hybridization and associated reductions in genetic variation

[1]Under development. On April 30, 2002, the U.S. District Court for the District of Columbia approved a NOAA Fisheries consent decree withdrawing a February 2000 Critical Habitat designation for this and 18 other ESUs.

or introduction of deleterious (non-adapted) genes. Hatchery fish can also directly displace natural spawning populations, compete for food resources, or engage in agonistic interactions (Campton and Johnston 1985; Waples 1991; Hilborn 1992; NMFS 1996a).

Within the Yakima River Basin, adult steelhead returns have averaged 1,665 fish (range 505 (1996) to 4,491 (2002)) between 1985 and 2002 as monitored at Prosser Dam (RM 47.1; YSS 2001; 2001 and 2002 data from Yakima-Klickitat Fisheries Program (YKFP), available at: www.ykfp.org). The comparatively large return of MCR steelhead to the Yakima Basin in 2002 reflects high numbers of returning salmon and steelhead observed across to the Columbia basin in the past two years.

Generally, adult MCR steelhead migration into the Yakima Basin peaks in late-October and again from late February or early March, concurrent with the spawning run. Steelhead adults begin passing Prosser Dam in late summer, suspend movement during the colder parts of December and January, and resume migration from February through June. The relative number and timing of wild adult steelhead returning during the fall and winter- spring migration periods varies from year to year, most likely because of a low-flow induced thermal barrier in the lower Yakima River in the fall (BOR 2000; YSS 2001). Most adult steelhead overwinter in the Yakima River between Prosser and Sunnyside Dams (RM 103.8) before moving upstream into tributary or mainstem spawning areas (Hockersmith *et al.* 1995). Steelhead spawning characteristics vary across temporal and spatial scales in the Yakima Basin, although the present spatial distribution is significantly decreased from historic conditions. Yakima Basin steelhead spawn in intermittent streams, mainstem and side-channel areas of larger rivers, and in perennial streams up to relatively steep gradients (Hockersmith *et al.* 1995; Pearsons *et al.* 1996). Hockersmith *et al*. (1995) identified the following spawning populations within the Yakima Basin: Upper Yakima River above Ellensburg, Teanaway River, Swauk Creek, Taneum Creek, Roza Canyon, mainstem Yakima River between the Naches River and Roza Dam, Little Naches River, Bumping River, Naches River, Rattlesnake Creek, Toppenish Creek, Marion Drain, and Satus Creek. Of 105 radio-tagged fish observed from 1990 to 1992, Hockersmith *et al.* (1995) found that well over half of the spawning occurs in Satus and Toppenish Creeks (59%), with a smaller proportion in the Naches drainage (32%), and the remainder in the mainstem Yakima River below Wapato Dam (4%), mainstem Yakima River above Roza Dam (3%), and Marion Drain (2%). Electrophoretic analyses have identified four genetically distinct spawning populations of wild steelhead in the Yakima Basin: the Naches, Satus, Toppenish, and Upper Yakima stocks (Phelps *et al.* 2000).

Typically, steelhead spawn earlier at lower, warmer elevations than higher, colder waters. Overall, most spawning is completed within the months of January through May (Hockersmith *et al*. 1995), although steelhead have been observed spawning in the Teanaway River (RM 176.1), a tributary to the Upper Yakima downstream of the Action Area, as late as July (NOAA Fisheries, 2003). Steelhead that spawn later in the year at higher elevations in the Yakima Basin, face lethal conditions (in most years) as out-migrating kelts (spawned-out adults returning to the ocean) in the lower Yakima River. Steelhead that spawn in the Yakima Basin at lower elevations can face the same hazardous conditions, however earlier spawn timing and emigration may provide increased survival because kelts traverse the lower Yakima River before water quality becomes lethal. High temperatures, low flows, and degraded water quality from irrigation effluents (*i.e.*, high temperature, turbidity and pollutant concentrations), contribute to extremely low survival during summer months (Vaccaro 1986; Lichatowich and Mobrand 1995; Lichatowich *et al.* 1995; Pearsons *et al*. 1996; Lilga 1998). Conditions in the lower Yakima River become suitable again for salmonids in early fall, near the end of the irrigation season (YSS 2001).

Juvenile steelhead use tributary and mainstem reaches throughout the Yakima Basin as rearing habitat, until they begin to smolt and migrate out of the subbasin. Downstream smolt migration begins in November, peaking between mid-April and May. Busack *et al*. (1991) analyzed scale samples from smolts and adult steelhead and found, generally, that smoltification occurs after two years in the Yakima system, with a few fish maturing after three years and an even smaller proportion reaching the smolt stage after one year. When compared to spawning distribution and run timing, these data suggest that various life stages of listed steelhead are present throughout the Yakima Basin and its tributaries virtually every day of the year.

The Upper Yakima River steelhead population was undoubtedly adversely affected by operations at Roza Dam (RM 128) between 1939 and 1958 (BOR 2000). Although fitted with a ladder, the pool at Roza Dam was kept down from the end of one irrigation season (mid-October) to the beginning of the next (mid-March) for these 20 years. Hockersmith *et al.* (1995) found that steelhead passed Roza Dam from November through March, and more recent data suggest that passage occurs from the end of September through May. Consequently, from 1939 to 1958, operations at Roza Dam virtually eliminated fish passage for most of the steelhead migration season, and excluded most steelhead bound for the upper Yakima from reaching their destination. Installation of a new ladder at Roza Dam in 1989 allows better passage, but only when the pool is completely up or down. The ladder is inoperable at levels between maximum and minimum pool when the reservoir is manipulated to facilitate screen maintenance at the end of October and early November. In addition, because of upstream dam operations, MCR steelhead spawning and emergence timing is shifted to later in the year in the Upper Yakima, and out-migrating smolts therefore meet hazardous if not lethal water quality conditions in the lower Yakima River. This combination of historic and contemporary seasonal factors could help explain the low abundance of MCR steelhead in the Upper Yakima basin.

Steelhead across the Yakima River Basin have faced a number of challenges in the recent past, but continue to persist although at significantly depressed population levels. The four genetically dissimilar stocks identified persist across widely varied conditions of streamflow, habitat, topography, elevation, and land management scenarios, in a fraction of their historic habitat.

2.1.2.1 Factors Affecting Middle Columbia River Steelhead Populations

Life History. Most fish in this ESU smolt at 2 years and spend 1 to 2 years in salt water before reentering freshwater, where they may remain up to a year before spawning (Howell *et al.* 1985). All steelhead upstream of The Dalles Dam are summer-run (Schreck *et al.* 1986, Reisenbichler *et al.* 1992, Chapman *et al.* 1994). The Klickitat River, however, produces both summer and winter steelhead, and age-2-ocean steelhead dominate the summer steelhead, whereas most other rivers in the region produce about equal numbers of both age 1- and 2-ocean fish. A nonanadromous form co-occurs with the anadromous form in this ESU; information suggests that the two forms may not be isolated reproductively, except where barriers are involved.

Habitat and Hydrology. Substantial habitat blockages are present in this ESU. In the Yakima Basin, Cle Elum, Rimrock, and Bumping Dams are examples of storage projects that have blocked many miles of formerly utilized habitats since the early 1900's. Water withdrawals and irrigation uses have dramatically reduced summer flows and resulted in a "flip-flop" of the natural hydrograph. This is significant because high summer and low winter water temperatures are limiting factors for salmonids in many streams in this region (Bottom *et al.* 1985).

Hatchery Influence. Continued increases in the proportion of stray steelhead in the Deschutes River basin is a major concern. The Oregon Department of Fish and Wildlife and the Confederated Tribes of the Warm Springs Reservation of Oregon (CTWSRO) estimate that 60% to 80% of the naturally spawning population consists of strays, which greatly outnumber naturally produced fish. Although the reproductive success of stray fish has not been evaluated, their numbers are so high that major genetic and ecological effects on natural populations are possible (Busby *et al.* 1999). The negative effects of any interbreeding between stray and native steelhead is intensified if the stray steelhead originated in geographically distant river basins, especially if the river basins are in different ESUs. The populations of steelhead in the Deschutes River basin include the following:

- Steelhead native to the Deschutes River
- Hatchery steelhead from the Round Butte Hatchery on the Deschutes River
- Wild steelhead strays from other rivers in the Columbia River basin
- Hatchery steelhead strays from other Columbia River basin streams

Regarding the latter, CTWSRO reports preliminary findings from a tagging study by T. Bjornn and M. Jepson (University of Idaho) and NOAA Fisheries suggesting that a large fraction of the steelhead passing through Columbia River dams (*e.g.*, John Day and Lower Granite dams) have entered the Deschutes River and then returned to the mainstem Columbia River. A key unresolved question about the large number of strays in the Deschutes basin is how many stray fish remain in the basin and spawn naturally.

For the MCR steelhead ESU as a whole, NOAA Fisheries estimates that the median population growth rate (lambda) over the base period[2] ranges from 0.88 to 0.75, decreasing as the effectiveness of hatchery fish spawning in the wild increases compared to that of fish of wild origin (McClure *et al.* 2000). NOAA Fisheries has also estimated the risk of absolute extinction for four of the spawning aggregations, using the same range of assumptions about the relative effectiveness of hatchery fish. At the low end, assuming that hatchery fish spawning in the wild have not reproduced (*i.e.,* hatchery effectiveness equals zero), the risk of absolute extinction within 100 years ranges from zero for the Yakima River summer run to 1.00 for the Umatilla River and Deschutes River summer runs (McClure *et al.* 2000). Assuming that the hatchery fish

[2] Estimates of median population growth rate, risk of extinction, and the likelihood of meeting recovery goals are based on population trends observed during a base period that varies between spawning aggregations. Population trends are projected under the assumption that all conditions will stay the same into the future.

spawning in the wild have been as productive as wild-origin fish (hatchery effectiveness equals 100%), the risk of absolute extinction within 100 years ranges from zero for the Yakima River summer run to 1.00 for the Deschutes River summer run (McClure *et al.* 2000).

2.1.3 Environmental Baseline in the Action Area

The environmental baseline is defined as: "the past and present impacts of all Federal, state, or private actions and other human activities in the action area, including the anticipated impacts of all proposed Federal projects in the action area that have undergone section 7 consultation and the impacts of state and private actions that are contemporaneous with the consultation in progress" (50 CFR 402.02). In step 2, NOAA Fisheries' evaluates the relevance of the environmental baseline in the action area to the species' current status.

In general, the environment for listed species in the Columbia River Basin (CRB), including those that migrate past or spawn upstream from the action area, has been dramatically affected by the development and operation of the Federal Columbia River Power System (FCRPS). Storage dams have eliminated mainstem spawning and rearing habitat, and have altered the natural flow regime of the Snake and Columbia rivers, decreasing spring and summer flows, increasing fall and winter flow, and altering natural thermal patterns. Power operations cause fluctuation in flow levels and river elevations, affecting fish movement through reservoirs, disturbing riparian areas and possibly stranding fish in shallow areas as flows recede. The eight dams in the migration corridor of the Snake and Columbia rivers kill or injure a portion of the smolts passing through the area. The low velocity movement of water through the reservoirs behind the dams slows the smolts' journey to the ocean and enhances the survival of predatory fish (Independent Scientific Group 1996, NRCC 1996). Formerly complex mainstem habitats in the Columbia, Snake, and Willamette Rivers have been reduced, for the most part, to single channels, with floodplains reduced in size, and off-channel habitats eliminated or disconnected from the main channel (Sedell and Froggatt 1984; Independent Scientific Group 1996; and Coutant 1999). The amount of large woody debris in these rivers has declined, reducing habitat complexity and altering the rivers' food webs (Maser and Sedell 1994).

Other human activities that have degraded aquatic habitats or affected native fish populations in the CRB include stream channelization, elimination of wetlands, construction of flood control dams and levees, construction of roads (many with impassable culverts), timber harvest, splash dams, mining, water withdrawals, unscreened water diversions, agriculture, livestock grazing, urbanization, outdoor recreation, fire exclusion/suppression, artificial fish propagation, fish harvest, and introduction of non-native species (Henjum *et al*. 1994; Rhodes *et al*. 1994; NRCC 1996; Spence *et al*. 1996; and Lee *et al*. 1997). In many watersheds, land management and development activities have: (1) reduced connectivity (i.e., the flow of energy, organisms, and materials) between streams, riparian areas, floodplains, and uplands; (2) elevated fine sediment yields, degrading spawning and rearing habitat; (3) reduced large woody material that traps sediment, stabilizes streambanks, and helps form pools; (4) reduced vegetative canopy that minimizes solar heating of streams; (5) caused streams to become straighter, wider, and shallower, thereby reducing rearing habitat and increasing water temperature fluctuations; (6) altered peak flow volume and timing, leading to channel changes and potentially altering fish migration behavior; and (7) altered floodplain function, water tables and base flows (Henjum *et* *al*. 1994; McIntosh *et al*. 1994; Rhodes *et al*. 1994; Wissmar *et al*. 1994; NRCC 1996; Spence *et al*. 1996; and Lee *et al*. 1997).

To address problems inhibiting salmonid recovery in CRB tributaries, the Federal resource and land management agencies developed the *All H Strategy* (Federal Caucus 2000). Components of the *All H Strategy* commit these agencies to increased coordination and a fast start on protecting and restoring. As described above, the Action Area includes the mainstem Yakima River and its associated riparian area and wetlands from approximately RM 180.7 downstream to RM 182.7, Hanson Pond One and Two, and the wetland areas associated with the ponds.

The headwaters of the Yakima River (fifth order) emerge from the crest of the Cascade Mountains above Keechelus Lake. From there, the Yakima River flows approximately 215 miles downstream to Richland, Washington where it enters the Columbia River at RM 335.2. Total Yakima River drainage basin area is roughly 6,155 square miles, encompassing over 1,900 miles of perennial streams. Major tributaries below the Action Area include the Teanaway River in the upper basin (downstream of the Action Area), the Naches River in the mid part of the basin, and Ahtanum, Toppenish, and Satus Creeks further downriver.

The Yakima basin occupies two physiographic provinces (the Columbia Plateau and Cascade Mountains), and three major ecoregions (Cascades, Eastern Cascades Slopes and Foothills and Columbia Basin (Omernik 1987). Consequently, climate, topography, precipitation, and vegetative cover are highly variable. In addition, the distribution and type of aquatic and terrestrial habitat is quite variable, supporting a wide range of species. Historically, the Yakima River subbasin once supported abundant and diverse runs of salmon and steelhead that now return in just a fraction of their historic numbers (Nehlsen *et al.* 1991; Tuck 1995; Busby *et al.* 1996; NMFS 1996a).

River and floodplain morphology is largely composed of single-thread and braided channels that occupy alluvial floodplains of glacial origin (*e.g.*, outwash and morainal material). Anthropogenic activities in the floodplain of the Yakima River, including railway and highway construction, have leveed, armored, realigned, and shortened the historic channel, virtually eliminating natural river-floodplain interactions. Two tributaries, Crystal Creek and the Cle Elum River, enter the Yakima River upstream of the Action Area. Railroad grades, local roads, and infrastructure have cut off other perennial and ephemeral tributaries in the Action Area.

The primary land use in the area is timber harvest; secondary land uses include recreation, winter sports, and grazing. Land-use activities (roading, grazing, and forest practices) have deteriorated factors such as sediment cycling and nutrient delivery. With respect to water temperature, bottom-draw release structures like those used at Cle Elum, Keechelus and Kachess Dams provides thermally homogeneous, cold discharge to the Yakima River, and may interfere with certain aspects of salmonid ecology in the Action Area (*e.g.*, migration cues, spawn timing, and growth).

Threatened MCR steelhead are currently affected by a number of habitat modifications within the Action Area. The most prominent and damaging modifications (to aquatic species) are the result of flow regulation and irrigation activities, as well as development in floodplain, riparian, and upland areas. Specifically, irrigation and development have had the following effects on the environmental baseline: (1) adversely affected instream flows, (2) degraded floodplain and streambank morphology and function, and (3) detached portions of the Yakima River and its tributaries from their historical floodplains creating impaired floodplain function. Dam operations at the headwaters of the Yakima River have created instream flow issues, related to delivery of irrigation demands, and have affected biotic and abiotic conditions in the Action Area. Generally, instream flow problems stem from chronically low discharge levels during reservoir refill periods to inordinately high flows out of phase with the ecology of steelhead when downstream demands are being met (a flip-flop of the natural hydrograph).

Low discharge levels can depress steelhead spawning flows in the Yakima River if low snowpack and runoff extend reservoir refill periods. Incubation, fry, and juvenile rearing conditions can be problematic as high discharge levels produce high velocity habitats that can displace individuals downstream. Spring chinook salmon spawn in the Yakima River during high irrigation delivery flows (August to Mid-September) that are cut by more than 90% for reservoir refill during incubation periods (mid-October through early spring). These incubation flows also dewater side channel habitats that are important to the juvenile life-stage of all salmonids.

Floodplain development and revetments, the realignment, channelization and armoring of the Yakima River in the Action Area, and floodplain roads have altered natural processes that served to (1) promote exchange of water and sediments between the rivers and their overbank habitats, (2) provide lateral habitat heterogeneity for MCR steelhead, and (3) maintain riparian habitat communities dependent on natural streamflow dynamics.

These activities have degraded riparian habitat by direct canopy removal, covering the ground with materials that preclude plant growth, reducing the widths of riparian zones, and altering the riparian species composition in favor of nonnative plants. For MCR steelhead, the lack of properly functioning riparian habitat contributes to instream temperatures that may seasonally exceed physiological tolerances and streambank erosion that increases sedimentation of spawning habitat. In addition, degraded riparian zones contribute an inadequate amount of LWD, and subsequently prevent or inhibit habitat forming processes such as pool formation and the establishment of instream cover. Although the Yakima River in the Action Area exhibits a small area of intact floodplain riparian habitats, flow management practices and floodplain infrastructure provide discharge out of phase with the natural hydrograph that is spatially and temporally incompatible with salmonid, riparian, and hyporheic species' requirements.

The pathways (Water Quality, Habitat Access, Habitat Elements, Channel Condition and dynamics, Flow/Hydrology, and Watershed Conditions) indirectly measure the baseline biological health of listed salmon populations through the health of their habitat. Specifically, each pathway is made up of a series of individual indicators (*e.g.*, indicators for Water Quality include Temperature, Sediment/Turbidity, and Chemical Contamination/Nutrients) that are measured or described directly (see, NMFS 1996b). Based on the measurement or description, each indicator is classified within a category of the properly functioning condition (PFC) framework: (1) *properly functioning*; (2) *at risk*; or (3) *not properly functioning*. Properly functioning condition is defined as "the sustained presence of natural habitat forming processes in a watershed that are necessary for the long-term survival of the species through the full range of environmental variation."

The biological requirements of MCR steelhead likely to be affected by the proposed action include water quality (sediment/turbidity) habitat elements (LWD, pools, off-channel habitat and refugia), channel condition and dynamics (floodplain connectivity, streambank condition, channel morphology), flow/hydrology pathway, and watershed conditions (riparian reserves). The characterization of these effects and a conclusion relating the effects to the continued existence of MCR steelhead is provided below. The factors affecting steelhead within the Action Area include instream flows, channel conditions and dynamics, and riparian habitat.

Water Quality: *Temperature*. The action area encompassing the preferred and alternative outfall locations is on the Washington Department of Ecology (WDOE 1998) 303(d) list for temperature. Thermal inputs into and upstream of the action area are contributed by the headwater impoundments of the river, by the existing Cle Elum wastewater outfall, by Crystal Creek (which currently conveys treated effluent from the City of Roslyn, by the YN's Cle Elum salmon hatchery approximately one mile upstream of the action area) by non-point sources, and by the lack of riparian shade over significant portions of the river.

Thirty-nine excursions were recorded above Class A temperature criteria at the WDOE monitoring station (RM 191) between 1998 and 2002 (WDOE 2003). This monitoring station is upstream of the Cle Elum River confluence and is the closest station to the project area. The Cle Elum River, which joins the Yakima at RM 186, has also been listed for temperature, with 26 excursions above Class A criterion (Entrix 2002). As the Cle Elum River can provide up to 50% of base flows in the Action Area, the thermal contributions of this tributary in the Action area are significant. Although there are significant thermal inputs into and upstream of the action area, these inputs do not generally cause water temperatures to exceed "not properly functioning" thresholds for spawning and migration as identified by NOAA Fisheries. Therefore the action area environmental baseline for temperature is considered "at risk".

Water Quality: Suspended Sediment and Turbidity. Fine sediments are not heavily embedded into the interstices of stream gravel and cobbles in the mainstem rock drop project area because of the high velocity gradients in this reach. Thus sources of fine sediments that could otherwise contribute to turbidity on rising hydrograph limbs are not excessive. Substrate underlying the scour pool where the outfall relocation is proposed is predominantly composed of cobble, with fine sediment deposited only in the deepest quiescent portions of the existing scour pool. Boulders predominate in the high velocity reach impinging on the north bank, upstream of the scour pool. Turbidity and suspended sediments are rapidly transported through the project area because of high velocity gradients inherent in this reach. Turbidity and suspended sediment currently discharged into the Yakima River via the existing outfall are not significant. The environmental baseline for this indicator is considered to be "properly functioning."

Water Quality: Chemical Contamination and Nutrients. Toxins released by municipal wastewater discharge generally include chlorine, ammonia and metals. The City has made interim improvements in their wastewater system to improve water quality. For example, the plant has been converted to ultraviolet light (UV) treatment system, replacing the use of chlorine disinfection. The UV system removes the potential impacts of a chlorine discharge into the river.

The Cascade ecoregion of the Yakima River that encompasses the action area is on the WDOE 303(d) list for water quality violations of 4,4'-DDE, and DDT. The WDOE listed the Yakima River for 4,4'-DDE and DDT because there were excursions beyond the criterion in edible tissue of whitefish collected in August, 1985. Cadmium and copper are the only metals that have been detected by WDOE in ambient monitoring near Cle Elum. Considering both the City discharge, and other sources of potential contamination in the action area, the environmental baseline for chemical contamination and nutrients in the action area is considered “at risk.”

Habitat Access: Physical Barriers. Presently access to Ponds One and Two are blocked by physical obstructions, insufficient flows, and vegetation. The environmental baseline is considered “at risk” because of the inability of salmonids to access most of the habitat potentially available within the Hanson Ponds habitat mosaic.

Habitat Elements: Substrate. High river velocities throughout the project area cause localized souring and transport fine sediments and spawning sized gravels downstream. As a result, project area substrate within the preferred outfall alignment is principally composed of cobble, large gravel and boulder, respectively. In the existing scour hole, at the pool bottom, some small amounts of silt have also deposited. Fine sediments throughout the action area have not significantly embedded gravel beds where spawning is actively occurring. Small gravel deposition that supports salmon and trout spawning begins about one-quarter mile downstream of the project area as the channel emerges from the leveed reach. The environmental baseline for substrate therefore is considered to be “properly functioning.”

Habitat Elements: Large Woody Debris. There is presently very little LWD in the action area. Wood retention in the channel is affected by the altered flow regime, so pools formed by wood are scarce in the action area. The recruitment potential of LWD into the channel is fair because of sufficient riparian reserves on vegetated islands and the south bank. Thus the environmental baseline for LWD in the action area is “at risk” based on NOAA Fisheries criteria (NMFS 1996b).

Habitat Elements: Pool Frequency. The project area reach contains one scour pool located at the alignment of the proposed rock drop, but is otherwise dominated by run habitat for approximately one-quarter mile downstream of the pool. Based on a field examination, pool frequency throughout the action area overall would rate as “not properly functioning.”

Habitat Elements: Pool Quality. Properly functioning pool quality provides pools with good cover, depths greater than one meter, and limited filling with fine sediments (NMFS 1996b). The pools within the project area consist of lateral scour pools and back eddies. Pools within the broader action area are also principally formed by rock or lateral scouring around island or channel margin habitat. Few pools are formed from wood because of the low abundance, recruitment and retention of LWD apparent throughout the reach. The lack of LWD presently limits good pool rearing habitat for juvenile salmonids in the action area; however, several large deep pools greater than one meter deep are found in the action area. Thus, the environmental baseline for this indicator supports and “at risk” rating.

Habitat Elements: Off-Channel Habitat. Significant off-channel habitat exists in the Hanson Ponds mosaic. The functionality of this habitat in particular is compromised because of a lack of upstream (flow-through) surface water connection to the Yakima River. Furthermore, much of the potentially available off-channel habitat in the action area, and the Yakima River as a whole is not accessible to salmonids and its lack is considered a “limiting factor” to stock recovery. For this reason, baseline for off-channel habitat is considered “not properly functioning.”

Habitat Elements: Refugia. Refugia habitat exists in side channel habitat created through the CMZ downstream of the project area, but within the lower portions of the action area. Additional habitat refugia is available in the accessible portions of the existing outlet channel of Hanson Ponds. A small area of flood-flow refugia is also available on the south bank of the river along the mainstem rock drop alignment. Existing refugia in the action area is insufficient in size and connectivity to maintain viable subpopulations, and is therefore considered “at risk.”

Channel Condition: Floodplain Connectivity. Floodplain connectivity is restricted throughout much of the project and action area by diking. Connectivity is particularly confined along the north bank, preventing overland flows that could otherwise support fringing wetlands and other floodplain functions. Connection of the Hanson Ponds to the mainstem is also currently prevented. Large portions of the south bank floodplain are not restricted and succession and integrity of riparian and riverine wetlands are properly functioning in these locations. Considering the conditions along both banks, the environmental baseline for floodplain connectivity is considered “at risk.”

Channel Condition: Riverbank Condition. This indicator references the degree of erosion along a riverbank, and how an action could affect this endpoint. A properly functioning riverbank is considered one with erosion affecting less than 10% of the riverbank (NMFS 1996b). The riverbank in the action area is largely diked, particularly along the north bank where erosion continues to be a problem. The riprapped dikes slow erosion, but obstruct natural bank conditions and prevent vegetation from becoming established. The existing baseline is therefore considered “at risk” for its erosion potential.

Flow/Hydrology Pathway: Peak and Base Flows. Peak and Base flows within the Yakima River are altered on an annual basis by the managed irrigation flows released from headwater impoundments in the watershed. These flow regulations cause high summer flows, and lower than normal fall, winter, and spring flows. The flow regulation also dampens peak and base flows that would otherwise occur. Because of the flow regulation, the environmental baseline for the peak and base flow habitat indicator is rated as “not properly functioning,” consistent with the NOAA Fisheries criteria relative to an undisturbed watershed of similar size.

Watershed Conditions: Riparian Reserves. Riparian reserves along the north bank within the action area have been disturbed by construction of the armored dikes that protect Hanson Ponds and I-90 from flood innundation, and by gravel road grade development in the riparian corridor within the Hanson Ponds recreational area. Diking is continuous along virtually the entire length of the north bank in the project area. Diking along the south bank upstream of the project has affected riparian reserves as well. The dikes (where present), along with consistent bankfull flows in the Yakima River, have prevented the establishment of a dense, multi-aged, and species-rich riparian corridor. Unlike the other portions of the project area riparian reserves along the south bank through which the mainstem rock drop will be constructed are relatively intact. Overall, the environmental baseline for the riparian reserves is therefore considered “at risk.”

2.2 Analysis of Effects

Effects of the action are defined as: "the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated or interdependent with the action, that will be added to the environmental baseline" (50 CFR 402.02). Direct effects occur at the project site and may extend upstream or downstream based on the potential for impairing the value of habitat for meeting the species’ biological requirements. Indirect effects are defined in 50 CFR 402.02 as “those that are caused by the proposed action and are later in time, but still are reasonably certain to occur.” They include the effects on listed species of future activities that are induced by the proposed action and that occur after the action is completed. “Interrelated actions are those that are part of a larger action and depend on the larger action for their justification” (50 CFR 403.02). “Interdependent actions are those that have no independent utility apart from the action under consideration” (50 CFR 402.02).

In brief, the proposed action will result in disturbance of the streambed in the main channel from equipment crossing and from placement of rock, alteration and slight loss of wetland/riparian habitat along the south bank from the rock drop key, increase in the stability of the north bank, increase in the riparian vegetation along the north bank, improvement of wastewater effluent treatment and resultant water quality, and a significant increase in the amount of essential juvenile rearing habitat with the enhancement and connection of Hanson Ponds to the Yakima River.

2.2.1 Direct Effects

Fish Disturbance. Salmonids will be exposed to construction effect in varying degrees depending on presence within the project area during the construction period. Adult MCR steelhead are not likely be present during the construction period. However, in-water work will not prevent upstream movement of any adults present during construction.

In contrast, juvenile steelhead are likely to be in the action area during construction, possibly using the south bank wetland area for rearing and holding. Listed fish present during the initial phases of construction will, in all likelihood temporarily seek to avoid construction related disturbance, minimizing the chance of injury or death. The timing for in-water work is proscribed to avoid exposure of spawning or incubating MCR steelhead.

Water Quality: Temperature. Wastewater effluent temperature at the proposed outfall relocation site was conservatively estimated to reach a maximum of 77 degrees Fahrenheit (° F). Because of rapid vertical mixing, the maximum estimated increase above ambient conditions will be 33.6° F. The NOAA Fisheries temperature indicator criteria for “properly functioning condition" is rated at 50 to 57.2° F, with "fair" conditions considered temperatures ranging from 57.2 to 64° F (NMFS 1996b). Although the modeled increase in temperature at the new outfall location could reduce the temperature rating in the immediate area from "properly functioning" to "fair," this indicator is overwhelmingly influenced by hydrograph manipulation related Bureau of Reclamation (BOR) Yakima System operations, not the wastewater input. Low flows in the action area do not occur in the summer, but in late October and mid-winter months, when ambient conditions are much lower than 50° F. The outfall relocation moves the heated discharge away from areas that are used heavily by salmon and trout at the present time (nearshore area). Therefore, when added to the environmental baseline, the functional condition of this water quality indicator is likely to improve.

Construction of the mainstem rock drop for bank protection and direction of Yakima River water into the Hanson Ponds will convey up to 10% of the river's flow. The ponds exhibit lake-like (lacustrine) conditions at the present time, with minimal shade. Under these conditions, water can warm creating the possibility of contributing to an unquantifiable, yet probably marginal increase in Yakima River temperature as pond water flows back into the river. The ponds, even with a change to more fluvial character after restoration, will likely slow the water slightly, providing time for the water temperature to increase before returning to the mainstem. As BOR system operations manipulate the natural flow regime in a way that creates colder than normative temperatures, Hanson Ponds will contribute to temperature complexity in the action area, with little or discernible affect on MCR steelhead.

Water Quality: Chemical Contamination and Nutrients. Relocation of the outfall mixing zone will greatly reduce the exposure of ammonia to the aquatic community. The new placement reduces the extent of river reach required to diffuse outfall effluent (the mixing zone). The mainstem rock drop location will achieve complete vertical mixing in the shortest distance possible downstream from the discharge point. Assuming a "7Q10" (consecutive 7 day flow with a 10 year recurrence interval) of 300 cfs, an acute dilution of 1.77 results in an acute mixing zone distance of two feet. Under the same conditions with a chronic dilution of 14.4, the chronic mixing zone distance is still only 21 feet. Furthermore, rapid mixing in the boat notch feature of the mixing zone should prevent toxic concentrations of unionized ammonia from affecting salmonids, as fish that may pass through the zone will not be confined, and will have the ability to move out of the area without restriction.

Construction of the mainstem rock drop by itself will not affect the chemical contamination baseline. However, the mixing zone at the rock drop location will improve the ability of the river to dilute metal and ammonia effluent constituents within a shorter distance downstream of the outfall when the effects of relocation are added to the environmental baseline.

Water quality (temperature, nutrients, metals, toxins) in the ponds and wetlands should be improved because of the increased flow-through of water and elimination of vehicle access on the dike access trail. Thus, water quality in the action area will improve when the effects of the action are added to the environmental baseline.

Water Quality: Turbidity. Several construction activities will mobilize sediments and temporarily increase downstream turbidity levels. These activities include, instream excavation, bank excavation, rock placement, equipment fording the river, and the installation of the mainstem rock drop, rebuilding the COE jetties rock barbs, and dike breaching in the mainstem Yakima River. Near construction activities (within several hundred feet), the level of turbidity will likely temporarily exceed natural background levels, potentially affecting MCR steelhead. Therefore, the proposed action provides several measures intended to avoid or minimize exposure of MCR steelhead to increased turbidity.

For salmonids, turbidity has been linked to a number of behavioral and physiological responses (i.e., gill flaring, coughing, avoidance, increase in blood sugar levels) which indicate some level of stress (Bisson and Bilby 1982; Sigler *et al.* 1984; Berg and Northcote 1985; Servizi and Martens 1992). The magnitude of these stress responses is generally higher when turbidity is increased and particle size decreased (Bisson and Bilby 1982; Servizi and Martens 1987; Gregory and Northcote 1993). Although turbidity may cause stress, Gregory and Northcote (1993) have shown that moderate levels of turbidity accelerate foraging rates among juvenile chinook salmon, likely because of reduced vulnerability to predators (camouflaging effect). When the particles causing turbidity settle out of the water column, they contribute to sediment on the riverbed (sedimentation). When sedimentation occurs, salmonids may be negatively affected: (1) buried salmonid eggs will be smothered and suffocated, (2) prey habitat may be displaced, and (3) future spawning habitat may be displaced (Spence *et al.* 1996). In addition, turbidity and subsequent sedimentation can affect the quality of stream substratum as spawning material, influence the exchange of streamflow and shallow alluvial groundwater, occupy channel storage areas for cobbles and gravels, increase width-depth ratios, depress riverine productivity, and contribute to decreased salmonid growth rates (Waters 1995; Newcombe and Jensen 1996; Shaw and Richardson 2001).

To avoid or minimize the effects of possible increased turbidity on MCR steelhead, the proposed action includes several measures: 1) specifically sequenced construction activities, 2) erecting a temporary gravel berm around the periphery of the excavation for the south channel gravel plug to confine turbidity, 3) constructing rock drop structure keys by beginning behind (*i.e.*, away from the stream channel) the existing bank and progressing waterward, 4) minimizing bed excavation for rock drop structures as proposed), 5) limiting in-water entry by large equipment (*e.g.*, rock for south bank key will be taken across and gravels from south channel plug will brought back on return trip to maximize efficiency), and 6) performing in-water construction activities during low-flow periods (October through December in 2002, October to mid-November thereafter).

Listed fish present during the initial phases of construction should exhibit avoidance behavior, temporarily moving to avoid turbidity, minimizing the likelihood of injury or death. In addition, the project work window is proscribed to the time of the year when neither spawning MCR steelhead nor incubating redds are present, and adult fish are most likely migrating in the smallest numbers. Because the reopened south channel, main rock drop, and rebuilt COE jetties along the north bank are designed to divert flow away from and stabilize the streambank, it is unlikely that they will cause long-term sedimentation problems in the Action Area. Instead, the overall project effects will be a reduction in baseline erosion rates and a decrease in associated turbidity and sedimentation in the future. Turbidity caused by this action is expected to be short-lived, returning to baseline levels soon after construction is over, and long-term effects (*i.e.*, loss or modification of habitat) will not occur. Other than the short-term inputs mentioned above, this project will not add to the existing baseline turbidity or sedimentation levels within the Action Area.

Habitat Access: Physical Barriers. Relocating the outfall upstream in a controlled mixing zone will improve the water quality in the nearshore area used by juvenile steelhead. As a result, water quality limitations on microhabitat access along the northern bank of the river near the existing outfall will be removed after the relocation of the outfall. Furthermore, when added to the environmental baseline, the effects of the proposed action include connecting the Hanson Ponds to the Yakima River. This action will remove existing barriers to over 83 acres of off-channel habitat for salmonids.

Habitat Element: Substrate. The construction elements of the outfall relocation alone will have no effect on substrate conditions in the Yakima River. Substrate conditions at the existing outfall location are not are not expected to change either since the existing outfall will be abandoned in place to eliminate unnecessary disturbance within the channel.

The addition of the mainstem rock drop will disturb the existing river substrate. The primary mechanisms of disturbance will be fording the river and rock placement for the drop structures. The direct effect on MCR steelhead of these sources streambed disturbance is expected to be minor. As stated above, construction timing is proscribed to avoid exposure of the most vulnerable life stages (spawning adults and incubating redds). Instead, the MCR steelhead life stages likely to be exposed to construction effect are those that are capable of avoidance behaviors, including juvenile and young-of-the-year fish. The most significant effect would be the temporary loss (burial or displacement) of some potential prey species (invertebrates) and their habitat.

Invertebrates (e.g., larval insects, obligate aquatic insects, molluscs, crustaceans etc.) recolonize disturbed areas by drifting, crawling, swimming, or flying in from adjacent areas (Mackay 1992). Lost foraging opportunities resulting from the disturbance of the mainstem Yakima River substrate will likely be short-lived as invertebrates will quickly recolonize the disturbed substrate (Allan 1995). Long-term effects to prey abundance and habitat are not predicted because (1) limited excavation of the streambed is required, (2) the fall work window coincides with high levels of invertebrate activity (and therefore recolonization potential), and (3) following construction, the riverbed substrate will be more diverse.

Increased flows through the egress channel of the ponds can be expected to clean underlying alluvial gravels likely deposited there from historic channel movements that have since been cut off by diking along the north bank. The cleansing of these gravels will likely improve macroinvertebrate colonization opportunities, and potentially provide additional spawning area for salmonids within the action area. Habitat effects related to substrate changes will be long-term, but will not result in an adverse effect to the suitability of the action area's habitat to support MCR steelhead. NOAA Fisheries concludes that the Hanson Ponds Restoration/ Enhancement elements of the project will improve substrate conditions when the effects of the proposed action are added to the environmental baseline.

Habitat Element: Large Woody Debris. The outfall relocation will have no affect on LWD abundance or recruitment in the action area. The construction of the outfall alignment has been designed to avoid removing any existing trees. Construction of the mainstem rock drop will also avoid the removal of large trees that could recruit into the river from the south bank. When added to the environmental baseline, the effects of these actions enable the existing level of function to passively improve over time.

The Hanson Ponds habitat mosaic includes design and placement of a significant amount of LWD into the ponds. The LWD might also be secured within the egress channel to improve habitat. Fill removed from the south channel gravel plug will be used to construct a planting bench downstream of the mainstem rock drop on the river side of the levee, and to create vegetated gravel bars projecting into the ponds. In addition, LWD will be placed in the lower side channel of the river, immediately adjacent to the levee road. Importation of LWD into the Hanson Ponds design is a key element of the enhancement measures proposed. When added to the environmental baseline, the effects of the proposed action on this habitat indicator will cause a significant improvement over existing conditions.

Habitat Element: Pool Frequency. The outfall relocation on its own will not affect pool frequency. Construction of the mainstem rock drop and adjacent (upstream) gravel bed removal will alter stream hydraulics and shift pool habitat within the unstable project area slightly downstream of the boat notch in the rock drop. Additional pool habitat may be created in the backwater immediately upstream of the rock drop. Overall, the outfall relocation and the mainstem rock drop will maintain pool frequency at the environmental baseline. However, there will be a significant increase in the number of pools in the action area by connecting the Yakima River to the Hanson Ponds and the ponds' egress channel. Because of the large pools made accessible within the Hanson Ponds, NOAA Fisheries concludes that when added to the environmental baseline, the effects of the proposed action will significantly improve pool frequency.

Habitat Element: Pool Quality. The outfall relocation will not effect overall pool quality. Construction of the Yakima River mainstem rock drop will create a pool downstream of the boat notch that will provide suitable hydraulic conditions for fish holding during their migration. However, it is unlikely that the pool formed below the boat notch will be significantly better that that which currently exists. Thus, the net effects of the outfall and rock drop will maintain existing pool quality.

Connecting the Yakima River to the Hanson Ponds will create a significant amount of good quality pool habitat. Additional pool habitat will be created within the egress channel from the ponds. NOAA Fisheries concludes that the effects of the project, when added to the environmental baseline, will significantly improve pool quality over existing conditions.

Habitat Element: Off-Channel Habitat. The outfall relocation and mainstem rock drop will have no effect on off-channel habitat. The Hanson Ponds Habitat Restoration/Enhancement measures will significantly increase the off-channel habitat available (increase of over 83 acres) for rearing and refugia by juvenile salmonids. The abundance of juveniles and resident adult salmonids is influenced by the quantity and quality of suitable habitat, food availability, and interactions with other species, including predators and competitors (Bjorn and Reiser 1991). The Hanson Ponds Restoration/Enhancement measures will create a variety of lentic and lotic habitats available to juvenile salmonids at all flows and seasons. Under existing conditions, the ponds are suitable habitat for several centrarchid and cyprinid species uncommon to the Upper Yakima River, including the largemouth bass, pumpkinseed sunfish and northern pikeminnow. With a reliable surface water connection and the creation of more fluvial conditions, the restored ponds will be less favorable to these species (given their more lacustrine preferences) and a shift in species dominance to salmonids can be expected. Thus, this habitat indicator will be significantly improved when the effects of the proposed action are added to the environmental baseline.

Habitat Element: Refugia. The outfall relocation and mainstem rock drop are not expected to have any effect on refugia. Refugia could be reduced in the short-term from localized increase in suspended sediment in the water column during rock placement in the mainstem, but these effects will be insignificant. The south bank key of the mainstem rock drop will fill a very small area of refugia through the south bank. However, waters will be backed up behind the rock drop, creating new refugia in the process.

Although the Hanson Ponds Habitat Restoration/Enhancement will alter the existing habitat conditions in the ponds so that they exhibit more fluvial characteristics, the lacustrine characteristics that now exist will not be completely eliminated. Salmonid predators such as the northern pikeminnow, and fish eating waterbirds such as the hooded merganser prefer such lacustrine conditions. However, high-velocity refugia will be created throughout the entire Hanson Ponds mosaic, greatly favoring the successful rearing of juvenile salmonids to smoltification. The habitat benefits created from the ponds hydrologic restoration, particularly in concert with the LWD, boulder placement, and other habitat improvements to be undertaken, will result in a significant improvement in refugia conditions over existing conditions, regardless of potential refugia also created for salmonid predators.

Channel Condition: Floodplain Connectivity. Neither the outfall relocation or mainstem rock drop will affect floodplain connectivity. These project elements will maintain the environmental baseline. However, opening Hanson Ponds will result in a significant net improvement over existing conditions for floodplain function. The project will significantly increase flood storage capacity in the area (previously excluded by the dikes).

Channel Condition: Riverbank Conditions. The outfall relocation will further modify the already modified riverbank. Modification will occur through a portion of the dike along the north bank already lined with riprap. The riverbank condition will be temporarily disturbed by equipment operated from the shoreline to construct the mainstem rock drop, particularly through the south bank. After construction, local bathymetry and shoreline integrity will be consistent with pre-project conditions relative to the habitat values provided by the riverbank because all disturbed areas will be replanted. More importantly, the mainstem rock drop will be constructed specifically to address the erosion and scour that are currently occurring along the north bank of the river. Given these considerations, the effects of the action, when added to the environmental baseline will improve the existing riverbank condition.

The riverbank conditions with the Hanson Ponds will become integrated within the overall riverbank conditions of the action area after the ponds are connected to the Yakima River. Diverting up to 10% of the river's flow will also provide a mechanism to dissipate erosive energies affecting mainstem riverbank conditions. Thus, when the temporary disturbance, erosion protection, and the ponds' restoration are considered on balance, NOAA Fisheries concludes that the net effect of the proposed action will result in a significant improvement over the existing conidtions.

Channel Condition: *Channel Morphology*. The construction of the rock drop will have several effects on the existing channel morphology of the Yakima River. First, the rock drop will incorporate vertical heterogeneity into the horizontal profile of the river. The drop will act as a step, creating an elevation difference between the water surface upstream and downstream. As water encounters the rock drop, it will decelerate, depositing sediments, and then increase velocity again while passing over the structure and downstream.

At the boat notch, the elevation gradient between upstream and downstream waters will be minimized and a greater volume of water (per area of the rock drop) will pass through. This will create scour conditions and pool formation immediately downstream. The boat notch will also prevent the rock drop from becoming a barrier to passage. The leveed reach of the Yakima River in the Action Area has produced hydraulic conditions that have encouraged the river to downcut and reside along the toe of the levee. These conditions are the usual response to extensive riprap application in conjunction with levee construction (Simons and Richardson 1966; Heede 1986). As such, the baseflow thalweg of the Yakima River is concentrated along the foundation of the levee, pulling the main portion of the channel to the left side of the reach. This condition increases the risk of high flows getting behind the WSDOT dike.

Reconstructing the COE jetties and opening the south channel will turn the thalweg of the Yakima River away from the north bank, and will spread discharge (requiring smaller amounts than under the present baseline) across the channel. Overall, sediment transport dynamics will benefit, and greater habitat complexity for native aquatic species assemblages will result. In addition, the channel of the Yakima River will better process elements vital to the overall aquatic foodweb (Stanford and Ward 1993). In the Yakima River, increasing the vertical heterogeneity of the channel by adding a rock drop will be an improvement over the existing environmental baseline. The proposed Hanson Pond enhancement will greatly increase the functional value of the reach by providing off-channel habitat for adults and juvenile salmonids, and providing areas where sediment accretion will help foster the growth of riparian plants. This, in turn, will serve as an improvement over existing conditions.

Flow/Hydrology Pathway: Peak and Base Flows. The outfall relocation and mainstem rock drop elements fo the overall project will have no effect on peak or base flows and will maintain this indicator. Diverting up to 10% of the river's flow into the Hanson Ponds could affect peak and base flows in the Yakima River over the distance of the diversion. Diverting flood flows will enable additional flood storage not presently available. Diverting base flows will provide habitat complexity over that provided alone within the Yakima River. The diversion does not serve a consumptive use, and will not affect the overall hydrograph with the broader action area. The effect of the Hanson Ponds restoration on peak and base flows within the action area can be considered an improvement over existing conditions.

Watershed Conditions: Riparian Reserves. Riparian reserves along the south bank will be modified by the placement of rock fill during construction of the mainstem rock drop at RM 181.2. A total of 0.48 acres of wetland will be affected by construction of the mainstem rock drop gravel scraping from the vegetated bar immediately upstream of the rock drop. North bank riparian habitat will also be disturbed by the removal of existing riprap and road grade fill for relocation of the outfall leading to the river. A small portion of wetlands (160 square feet) that extends from the northwestern bank of the Pond Two will also be disturbed by the placement of the pipeline along the preferred outfall alignment.

Effects on riparian reserves from the construction of the Hanson Ponds (*e.g*., smaller rock drops, inlet channel, armoring for flow and flood control) is anticipated to be less than 0.25 acres. Thus the total riparian disturbance will be short-term and direct, and is not anticipated to exceed 0.5 acres. In addition, the Hanson Ponds project action also includes the planting of riparian vegetation around the Hanson Ponds where short-term construction disturbance occurs, and on peninsulas to be permanently created within the ponds. Most importantly, providing surface water connection to the Hanson Ponds from the Yakima River will enable steelhead access to habitats that are bordered by extensive existing riparian reserves. Thus, an immediate net increase in riparian reserves is anticipated and the project action is considered to improve the existing conditions.

2.2.2 Indirect Effects

Indirect effects are caused by the proposed action, are later in time, and are reasonably certain to occur (50 CFR 402.02). Indirect effects may occur outside of the area directly affected by the action. Indirect effects may include the effects of other Federal actions that have not undergone Section7 consultation, but will result from the action under consultation. These actions must be reasonably certain to occur, or be a logical extension of the proposed action. The indirect effects resulting from the proposed project include: (1) deposition of sediment upstream of the rock drop;(2) alteration of wetlands in the action area; (3) increase in juvenile salmonid survival with the addition of a large amount of off-channel rearing habitat.

Sediment Deposition and Scour Pools. After installation of the rock drop, sediments will begin accumulating on the upstream side of the structure. Sediments accumulating on the upstream face of the Yakima River drop structure could provide spawning substrate for native fish assemblages in a reach that is relatively devoid of such suitable material. The recruitment of sediments into areas that experience unnatural scour conditions (*i.e.,* Yakima River between WSDOT levees) is viewed as a beneficial effect. The rock drop will maintain an existing pool downstream of the boat notch. The overall indirect effect is expected to be a net improvement in baseline conditions (pool quality) through improved habitat complexity (see below).

Alteration of Wetlands. Wetlands One and Two (Appendix A, Figure 7) currently would be classified as depressional outflow under the Hydrogeomorphic (HGM) system of wetland classification. The proposed project will alter the wetlands to be riverine flow-though in that they would regularly be receiving water from the Yakima River. Because this entire area was once all river floodplain, this change will restore the wetlands to the HGM type that is typical for this geomorphic setting.

It is estimated that a maximum of 0.25 acre of forested wetland will be more deeply inundated than present conditions. Some of this area will likely transition to more flood-tolerant shrubs and emergent species, while some portion of it will be too deeply inundated to maintain vegetation. It is estimated that roughly 5,700 square feet (0.13 acre) of existing wetland will be lost and 3,200 square feet (0.07 acre) of new wetland will be created. The time lag in replacement of forested wetland is the most significant negative impact to functions in Wetland One (Appendix A, Figure 7). However, it must be remembered that this will only affect approximately 0.25 acre, or five percent of a 4.6 acre wetland.

Connecting the river to the Hanson Pond system means that anadromous fish will have better access to wetlands. This type of quiet off-channel habitat is highly valuable to juvenile salmonids that seek slower-moving, shallower areas to feed, rest, and find refuge from larger fish predators. The rock drops and deeper water levels are designed to facilitate fish use and fish passage throughout the entire pond/wetland system.

Overall positive effects to wetlands include: (1) restoring wetlands to an HGM type typical for this riverine setting; (2) restoration of the river connection will provide anadromous access to side channel habitat; (3) the project will significantly increase flood storage capacity in the area; (4) water quality in the ponds and wetlands should be enhanced because of the increased flow-though of water and the elimination of vehicle access on the dike access trail.

Juvenile Salmonid Survival. The abundance of juvenile salmon and trout in streams is a function of many factors, including abundance of newly emerged fry, quantity and quality of suitable habitat, abundance and composition of food, and interactions with other fish, birds, and mammals. Environmental factors can affect the distribution and abundance of juvenile salmonids throughout a stream or within specific segments of a stream. Temperature, productivity, suitable space, and water quality are examples of variables that regulate the general distribution and abundance of fish within a stream or drainage.

The increase in off-channel habitat is likely to improve steelhead survival in the Upper Yakima River.

2.2.3 Cumulative Effects

Cumulative effects are defined in 50 CFR 402.02 as "those effects of future State or private activities, not involving Federal activities, that are reasonably certain to occur within the Action Area of the Federal action subject to consultation." These activities within the Action Area also have the potential to adversely affect the listed species and critical habitat. Future Federal actions, including the ongoing operation of hydropower systems, hatcheries, fisheries, and land management activities are being reviewed through separate section 7 consultation processes. Federal actions that have already undergone section 7 consultations have been added to the description of the environmental baseline in the Action Area.

Economic diversification has contributed to population growth and movement, and this trend is likely to continue. Such population trends will result in greater overall and localized demands for electricity, water, and buildable land in the Action Area; will affect water quality directly and indirectly; and will increase the need for transportation, communication, and other infrastructure. The impacts associated with these economic and population demands will probably affect habitat features such as water quality and quantity, which are important to the survival and recovery of the listed species. The overall effect will likely be negative, unless carefully planned for and mitigated.

The state of Washington has various strategies and programs designed to improve the habitat of listed species and assist in recovery planning. Washington's 1998 Salmon Recovery Planning Act provided the framework for developing watershed restoration projects and established a funding mechanism for local habitat restoration projects. The Watershed Planning Act, also passed in 1998, encourages voluntary planning by local governments, citizens, and Tribes for water supply and use, water quality, and habitat at the Water Resource Inventory Area or multi-Water Resource Inventory Area level. The WDFW and tribal co-managers have been implementing the Wild Stock Recovery Initiative since 1992. The co-managers are completing comprehensive species management plans that examine limiting factors and identify needed habitat activities. The State is also establishing the Lower Columbia Fish Recovery Board to begin drafting recovery plans for the lower Columbia region. Water quality improvements will be proposed through development of Total Maximum Daily Loads (TMDL). The state of Washington is under a court order to develop TMDL management plans on each of its 303(d) water-quality-listed streams. It has developed a schedule that is updated yearly; the schedule outlines the priority and timing of TMDL plan development.

2.2.4 Summary and Synthesis

The net effect of the outfall relocation and Hanson Ponds Restoration/Enhancement project actions on each of the Matrix of Pathways and Indicators (MPI) habitat indicators is discussed above. In brief, relocating the wastewater outfall to RM 181.2, construction of the rock drop at this location, and establishing a surface water connection to the Hanson Ponds will permanently change the hydraulics and improve stability within this section of the river by providing floodplain storage. The outfall location proposed is a substantial improvement over its existing location because of accelerated mixing there that will enable the compliance with water quality criteria nearly instantaneously (as opposed to several hundred feet downstream as currently occurs). The outfall relocation therefore can be considered to improve baseline water quality in the action area. The outfall relocation has the added benefit of relocating the discharge from its existing location of high fish abundance, to one of low abundance, thus reducing the concentrations of effluent constituents to which steelhead are exposed.

The stability of the north bank will be substantially increased at the location where the outfall is proposed, by constructing a rock drop to reduce stream velocities impinging on the north bank, and by directing a portion of the flow of the river into the Hanson Ponds. Constructing a direct connection between the Yakima River and the Hanson Ponds will increase flow-through circulation, improve water quality, create off-channel salmonid rearing habitat, improve floodplain connectivity, and provide for additional flood storage. Spawning habitat will likely develop upstream of the mainstem rock drop, facilitated by deposition of gravels that were previously transported downstream by the high scouring velocities currently existing at the mainstem rock drop alignment location.

Other aquatic biota, wildlife, and plant species temporarily restricted from access the project area during construction will not be adversely affected in the long-term. Providing access to the Hanson Ponds habitat mosaic will result in a net improvement over existing conditions for anadromous and resident salmonids. Refugia will be significantly altered in the project area, but the net alterations will benefit steelhead spawning, incubating, and rearing areas by enlarging the floodplain, increasing the amount of off-channel habitat and increasing the habitat complexity in the mainstem and the Ponds.

Taken together, the effects summarized above will contribute to improved conditions when added to the existing environmental baseline. These improvements will enable the action area to better provide the biological requirements of MCR steelhead, beneficially influencing existing population conditions.

2.3 Conclusions

NOAA Fisheries has reviewed the direct, indirect, and cumulative effects of the poposed action on MCR steelhead and their habitat. NOAA Fisheries evaluated these effects in light of existing conditions in the action area and measures included in the action to minimize effects. On balance, the effects of the proposed action will contribute to increased salmonid distribution, reproduction, and numbers. Therefore, the proposed action is not likely to jeopardize the continued existence of MCR steelhead.

2.4 Reinitiation of Consultation

This concludes formal consultation for funding of a project to relocate the City wastewater treatment outfall, construct a mainstem rock drop, and restore/enhance the Hanson Ponds area. As provided in 50 CFR 402.16, reinitiation of formal consultation is required if: 1) The amount or extent of taking specified in the Incidental Take Statement is exceeded, or is expected to be exceeded; 2) new information reveals effects of the action may affect listed species in a way not previously considered; 3) the action is modified in a way that causes an effect on listed species that was not previously considered; or 4) a new species is listed or critical habitat is designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease, pending conclusion of the reinitiated consultation. Upon reinitiation, the protection provided by this incidental take statement, section 7(o)(2), becomes invalid.

2.5 Incidental Take Statement

The ESA at section 9 [16 U.S.C. 1538] prohibits take of endangered species. The prohibition of take is extended to threatened anadromous salmonids by section 4(d) rule [50 CFR 223.203]. Take is defined by the statute as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct." [16 U.S.C. 1532(19)] Harm is defined by regulation as "an act which actually kills or injures fish or wildlife. Such an act may include significant habitat modification or degradation which actually kills or injures fish or wildlife by significantly impairing essential behavior patterns, including, breeding, spawning, rearing, migrating, feeding or sheltering." [50 CFR 222.102] Harass is defined as "an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering." [50 CFR 17.3] Incidental take is defined as "takings that result from, but are not the purpose of, carrying out an otherwise lawful activity conducted by the Federal agency or applicant." [50 CFR 402.02] The ESA at section 7(o)(2) removes the prohibition from any incidental taking that is in compliance with the terms and conditions specified in a section 7(b)(4) incidental take statement [16 U.S.C. 1536].

An incidental take statement specifies the impact of any incidental taking of endangered or threatened species. It also provides reasonable and prudent measures (RPM) that are necessary to minimize impacts and sets forth terms and conditions with which the action agency must comply in order to implement the reasonable and prudent measures.

2.5.1 Amount or Extent of Take

As stated in section 2.1.2 above, MCR steelhead use the action area for migration, rearing, and spawning habitat. Juvenile MCR steelhead are likely to be present in the action area any day of the year, and a small number of adults are likely to be in the area during the proposed work window. Therefore, incidental take of MCR steelhead is reasonably certain to occur from the construction elements of the proposed action. The proposed action includes measures to reduce the likelihood and amount of incidental take. Some elements of the proposed action are required to minimize the impact of such incidental taking, and so are included as RPMs.

Take caused by the project is likely in the form of harm, where habitat modifications will temporarily interfere with normal behavioral patterns of MCR steelhead. Harm is likely to result from mechanical injury, turbidity or sedimentation, or temporary lost foraging opportunities caused by displacement of benthic production areas. The amount of take from these causes is impossible to estimate. In instances where the number of individual animals to be taken cannot be reasonably estimated, NOAA Fisheries uses a surrogate approach to estimate extent. The surrogate, in this case habitat, should provide an obvious threshold of exempted take which, if exceeded, provides a basis for reinitiating consultation.

This Opinion analyzes the extent of effects to MCR steelhead from removing 1,950 square feet of riparian area for the south key and adding approximately 3,435 cubic yards of instream rock structures that will cover approximately 40,215 square feet of benthic habitat in the Action Area. The effects of covering this amount of benthic habitat will be minimized by: (1) the creation of a 5,300-foot long off-channel area that provides year-round rearing and refuge habitat; (2) the restoration of access by the Yakima River to at least 83 acres of floodplain; and (3) addition of more than 1,100 linear feet of LWD along the north bank (at least 300 linear feet will be below the OHWM). Despite the use of the best scientific and commercial data available, NOAA Fisheries cannot estimate the number of fish that would be injured or killed by these occurrences. Therefore, the extent of take anticipated in this statement is that which would occur from the construction and maintenance of one mainstem rock drop requiring approximately 3,435 cubic yards of rock covering about 40,215 square feet of benthic habitat. Should any of these thresholds be exceeded during project activities, the reinitiation provisions of this Opinion apply.

2.5.2 Reasonable and Prudent Measures

The measures described below are non-discretionary. They must be implemented so that they become binding conditions in order for the exemption in section 7(a)(2) to apply. NOAA Fisheries has the continuing duty to regulate the activities covered in this incidental take statement. If NOAA Fisheries fails to adhere to the terms and conditions of the incidental take statement through enforceable terms added to the document authorizing this action, or fails to retain the oversight to ensure compliance with these terms and conditions, the protective coverage of section 7(o)(2) may lapse.

NOAA Fisheries believes that the following RPMs, along with conservation measures described in the BA, are necessary and appropriate to minimize the take of ESA-listed fish resulting from implementation of this Opinion.

1. NOAA Fisheries will minimize take by incorporating best management practices (BMPs) to reduce potential impacts of staging and onshore construction activities.

2. NOAA Fisheries will minimize take by incorporating BMPs to reduce potential impacts of instream construction activities.

3. NOAA Fisheries will minimize take by ensuring development of functional riparian and wetland habitat.

4. NOAA Fisheries will minimize take by incorporating appropriate timing restrictions during project construction.

2.5.3 Terms and Conditions

To be exempt from the prohibitions of section 9 of the ESA, the action must be implemented in compliance with the following terms and conditions, which implement the reasonable and prudent measures described above for each category of activity. These terms and conditions are non-discretionary.

1. Implement RPM No. 1 by ensuring the following:

   a. A Temporary Erosion and Sediment Control (TESC) plan will be implemented.

   b. A Spill Prevention, Control, and Containment (SPCC) plan will be implemented.

   c. Hydraulic fluid in heavy equipment will be replaced with mineral oil or other biodegradable, non-toxic hydraulic fluid.

d. All heavy equipment will be clean and free of external oil, fuel, or other potential pollutants.

2. Implement RPM No. 2 by conducting the following:

a. To the maximum extent practicable, equipment will work from on-shore (or constructed) work areas, with the exception of the excavation of the south channel plug when equipment will need to be in the abandoned channel.

b. During construction of the rock drop, work will progress from the banks of the river towards the center. The excavator will travel on rocks previously placed to the maximum extent practicable.

c. During placement of LWD downstream of the planting bench, equipment will work from the levee and will not enter the channel.

d. Prior to instream construction of the rock drop, any large equipment intended for instream use will be steam cleaned.

e. Placement of rocks and/or LWD structural components will be done by a qualified excavator operator. Material will be "placed" and not dumped.

f. Any fill material entering the Yakima River will be native rock, clean, and free of fine sediment.

g. Prior to starting instream work, WDFW and/or YN fisheries biologists will survey the action area to redds. If redds are observed, they will be marked at the shoreline and measures will be taken to prevent sediment mobilized by the action from reaching any redds (*e.g.*, use of bulk bags as discussed, Reichmuth, pers. comm. Sept 29, 2003).

h. In the event that listed steelhead are killed or injured during the construction process, the qualified fishery scientist will immediately contact NOAA Fisheries.

i. Restoration/enhancement of Hanson Ponds aquatic habitat will occur before connection to the river is complete.

j. The construction manger will administer the TESC Plan and the SPCC plan.

3. Implement RPM No. 3 by conducting the following:

a. Riparian plantings described in the BA and the wetland mitigation plan will be conducted at a ratio of six to one for each species lost. Some areas that are not part of the project's required mitigation will be planted at a ratio determined by the project manager.

b. Riparian plantings within Hanson Ponds, along the dike breaches and the planting bench will be conducted as designed by Sheldon & Associates, August 2003.

c. To compensate for the anticipated loss of 0.8 acre of wetland, a minimum of 0.64 acre of new wetland will be created.

d. All plantings will use native species appropriate for riparian use and will be planted by hand tools or non-invasive mechanical methods.

e. All plantings will be monitored for at least five years to ensure 80% survival; replanting will occur if survival rates are less than 80%. This only applies to the wetland mitigation areas, as described by Sheldon and Associates (2003). The levee area, and other locations along Hanson Ponds will be planted as part of the overall restoration plan for the area, but are not included as wetland mitigation. These areas will be extremely difficult to replant, because the soils are well-drained, rocky, and deficient in organic matter. It is expected that revegetation success will be extremely low in these areas. Because the levee area is not part of the required wetland mitigation, the 80% survival rate will not apply to the levee area.

f. Each year for five years, a monitoring report detailing planting locations, methods, composition, and survival will be submitted to:

NMFS-WHB
Ellensburg Field Office
Attn: Diane Driscoll
304 South Water St., Ste. 201
Ellensburg, WA 98926

4. Implement RPM No. 4 by conducting the following:

a. Work in the Yakima River channel south of the levee will be done only during low river flow and only during the time period from October 15 through December 31, 2003.

b. Work on other project elements including most of the work in the side channel north of the levee will be done during the time period from August 11, 2003 through February 15, 2004 and July 15, 2004 through December 31, 2004.

c. Placement of LWD in the side channel is permitted outside of the specified work window under the following conditions: (1) The LWD will be placed with equipment operating from the levee access road; (2) No excavation or filling will occur; (3) Soils will be removed from LWD prior to placement in the side channel; (4) The side channel will be surveyed by a YN or WDFW fisheries biologist for presence of spawning/holding steelhead prior to placing LWD; (5) The LWD will be placed during base flow conditions.

All terms and conditions will be included in any permit, grant, or contract issued to the implementation of the action described in this Opinion.

3.0 MAGNUSON-STEVENS FISHERY CONSERVATION AND MANAGEMENT ACT

3.1 Statutory Requirements

The MSA, as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267), established procedures designed to identify, conserve, and enhance EFH for those species regulated under a Federal fisheries management plan.

Pursuant to the MSA:

- Federal agencies must consult with NOAA Fisheries on all actions, or proposed actions, authorized, funded, or undertaken by the agency, that may adversely affect EFH (section 305(b)(2)).

- NOAA Fisheries must provide conservation recommendations for any Federal or State action that may adversely affect EFH (section 305(b)(4)(A));

- Federal agencies must provide a detailed response in writing to NOAA Fisheries within 30 days after receiving EFH conservation recommendations. The response must include a description of measures proposed by the agency for avoiding, mitigating, or offsetting the impact of the activity on EFH. In the case of a response that is inconsistent with NOAA Fisheries EFH conservation recommendations, the Federal agency must explain its reasons for not following the recommendations (section 305(b)(4)(B)).

According to the MSA (section 3), EFH means those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity. For the purpose of interpreting this definition of EFH: Waters include aquatic areas and their associated physical, chemical, and biological properties that are used by fish and may include aquatic areas historically used by fish where appropriate; substrate includes sediment, hard bottom, structures underlying the waters, and associated biological communities; necessary means the habitat required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem; and "spawning, breeding, feeding, or growth to maturity" covers a species' full life cycle (50 CFR 600.10). Adverse effect means any impact which reduces quality and/or quantity of EFH, and may include direct (e.g., contamination or physical disruption), indirect (e.g., loss of prey or reduction in species fecundity), site-specific, or habitat-wide impacts: including individual, cumulative, or synergistic consequences of actions (50 CFR 600.810).

Consultation with NOAA Fisheries is required for any Federal agency action that may adversely affect EFH, including actions that occur outside EFH, such as certain upstream and upslope activities.

The objectives of this EFH consultation are to determine whether the proposed action may adversely affect designated EFH and to recommend conservation measures to avoid, minimize, or otherwise offset potential adverse effects to EFH.

3.2 Identification of Essential Fish Habitat

Pursuant to the MSA the Pacific Fisheries Management Council (PFMC) has designated EFH for three species of Federally-managed Pacific salmon: chinook (*Oncorhynchus tshawytscha*); coho (*O. kisutch*); and Puget Sound pink salmon (*O. gorbuscha*) (PFMC 1999). Freshwater EFH for Pacific salmon includes all those streams, lakes, ponds, wetlands, and other water bodies currently, or historically accessible to salmon in Washington, Oregon, Idaho, and California, except areas upstream of certain impassable man-made barriers (as identified by the PFMC 1999), and longstanding, naturally-impassable barriers (i.e., natural waterfalls in existence for several hundred years). Detailed descriptions and identifications of EFH for salmon are found in Appendix A to Amendment 14 to the Pacific Coast Salmon Plan (PFMC 1999). Assessment of potential adverse effects to these species' EFH from the proposed action is based, in part, on this information.

3.3 Proposed Actions

The proposed action and action area are detailed above in Sections 1.2 and 1.3 of this document. The action area includes habitats that have been designated as EFH for various life-history stages of chinook and coho salmon.

3.4 Effects of Proposed Action on Essential Fish Habitat

The effects on chinook and coho salmon are the same as those for ESA listed species and are described in detail in Section2.2.1 of this document. The proposed action may result in short- and long-term adverse effects on a variety of habitat parameters. These adverse effects are:

1. Short-term degradation of benthic foraging habitat because of the disturbance of approximately 40,215 square feet of area below the OHWM.

2. Short-term degradation of water quality in the action area because of an increase in turbidity during in-water construction and the potential for contaminants to reach the stream.

3. A net loss of approximately 0.8 acres of wetland.

3.5 Conclusion

NOAA Fisheries concludes that the proposed action may adversely affect designated EFH for chinook and coho salmon.

3.6 Essential Fish Habitat Conservation Recommendations

Pursuant to Section305(b)(4)(A) of the MSA, NOAA Fisheries is required to provide EFH conservation recommendations to Federal agencies regarding actions that may adversely affect EFH. While NOAA Fisheries understands that the conservation measures described in the BA will be implemented by NOAA Fisheries it does not believe that these measures are sufficient to address the adverse impacts to EFH described above. Consequently, NOAA Fisheries recommends that NOAA Fisheries implement the following actions to minimize the potential adverse effects to EFH for chinook and coho salmon:

1. To minimize EFH adverse effect No.1 (degradation of benthic foraging habitat) NOAA Fisheries will ensure that:

   a. All work in the Yakima River channel south of the levee will be done only during low river flow and only during the time period from October 15 through December 31, 2003. Work on other project elements including work in the side channel north of the levee will be done only during the time period from August 11, 2003 through Feburary 15, 2004 and July 15, 2004 through December 31, 2004.

   b. To the maximum extent practicable, equipment will work from on-shore (or constructed) work areas, with the exception of the excavation of the south channel plug when equipment will need to be in the abandoned channel.

   c. During placement of LWD downstream of the rock drop, equipment will work from the levee and will not enter the channel.

   d. Prior to instream construction of the rock drop, any large equipment intended for instream use will be steam cleaned.

   e. During construction of the rock drop, work will progress from the banks of the river towards the center. The excavator will travel on rocks previously placed to the maximum extent practicable.

   f. Placement of rocks and/or LWD structural components will be done by a qualified excavator operator.

   g. Material (e.g., rocks, LWD) will be "placed" and not dumped.

2. To minimize EFH adverse effect No. 2 (water quality), NOAA Fisheries will ensure that:

   a. The contractor has a SPCC and a TESC Plan in place prior to the start of any construction activities.

   b. Use bulk bags or a turbidity curtain to contain suspended sediments during instream work if salmonid redds are found within the Action Area. This will reduce the potential for deleterious turbidity impacts on downstream redds in the project area.

3. To minimize EFH adverse effect No.3 (loss of wetland habitat), NOAA Fisheries should:

   Construct an additional 0.64 acres of wetland in the Action Area in an appropriate location near the project site to replace the habitat that will be lost.

3.7 Statutory Response Requirement

Pursuant to the MSA (section 305(b)(4)(B)) and 50 CFR 600.920(j), Federal agencies are required to provide a detailed written response to NOAA Fisheries' EFH conservation recommendations within 30 days of receipt of these recommendations. The response must include a description of measures proposed to avoid, mitigate, or offset the adverse impacts of the activity on EFH. In the case of a response that is inconsistent with the EFH conservation recommendations, the response must explain the reasons for not following the recommendations, including the scientific justification for any disagreements over the anticipated effects of the proposed action and the measures needed to avoid, minimize, mitigate, or offset such effects.

3.8 Supplemental Consultation

The action agency must reinitiate EFH consultation with NOAA Fisheries if the proposed action is substantially revised in a manner that may adversely affect EFH, or if new information becomes available that affects the basis for NOAA Fisheries' EFH conservation recommendations (50 CFR 600.920(l)).

4.0 REFERENCES

Allan, J.D. 1995. Stream Ecology: structure and function of running waters. Chapman and Hall, Inc., New York.

Berg, L., and T. G. Northcote. 1985. Changes in territorial, gill-flaring, and feeding behavior in juvenile coho salmon (*Oncorhynchus kisutch*) following short-term pulses of suspended sediment. Can. J. Fish. Aquat. Sci. 42: 1410-1417.

Bishop, S., and A. Morgan, (eds.). 1996. Critical habitat issues by basin for natural chinook salmon stocks in the coastal and Puget Sound areas of Washington State. Northwest Indian Fisheries Commission, Olympia, WA, 105 pp.

Bisson, P. A., and R. E. Bilby. 1982. Avoidance of suspended sediment by juvenile coho salmon. N. Am. J. Fish. Manage. 4: 371-374.

Bjornn, T.C. and D.W. Resier. 1991. Habitat requirement s of salmonids in streams. American Fisheries Society Special Publication 19: 83-139.

Bottom, D. L., P. J. Howell, and J. D. Rodgers. 1985. The effects of stream alterations on salmon and trout habitat in Oregon. Oregon Department of Fish and Wildlife, Portland.

Bureau of Reclamation (BOR). 2000. Biological assessment: Yakima project operations and maintenance-Supplemental to the December, 1999 Biological assessment on the Federal Columbia river power system. Pacific Northwest Region, Upper Columbia Area Office, Yakima, Washington. 236 pp.

Busack, C., C. Knudsen, A. Marshall, S. Phelps and D. Seiler. 1991. Yakima Hatchery Experimental Design. Annual Progress Report DOE/BP-00102, Bonneville Power Administration, Div. of Fish and Wildlife, Portland, Oregon. 226 pp.

Busby, P. J., T. C. Wainwright, G. J. Bryant, L. J. Lierheimer, R. S. Waples, F. W. Waknitz, and I. V. Lagomarsino. 1996. Status review of West Coast steelhead from Washington, Idaho, Oregon, and California. NOAA Tech. Memo. NMFS-NWFSC-27, 261 p.

Busby, P., and 10 co-authors. 1999. Updated status of the review of the Upper Willamette River and Middle Columbia River ESUs of steelhead *(Oncorhynchus mykis*s). National Marine Fisheries Service, Northwest Fisheries Science Center, West Coast Biological Review Team, Seattle, Washington.

Campton, D. E., and J. M. Johnston. 1985. Electrophoretic evidence for a genetic admixture of native and nonnative rainbow trout in the Yakima River, Washington. Trans. Am. Fish. Soc. 114: 782-793.

Chapman, D., C. Pevan, T. Hillman, A. Giorgi, and F. Utter. 1994. Status of summer steelhead in the mid-Columbia River. Don Chapman Consultants, Inc., Boise, Idaho.

Cosmopolitan (Cosmopolitan Engineering Group). 2002. Appendix D: Mixing Zone Study *in* Draft Cle Elum Regional Sewerage Facilities Plan. *In* City of Cle Elum Wastewater Treatment Plant Outfall Relocation and Hanson Ponds Habitat Restoration and Enhancement: Biological evaluation of potential impacts to threatened and endangered species and essential fish habitat. Prepared for City of Cle Elum, Washington. Prepared by Entrix, Inc, Olympia Washington. Project No. 396901, November 22, 2002.

Coutant, C.C. 1999. Perspectives on Temperature in the Pacific Northwest's Fresh Waters. Environmental Sciences Division Publication 4849 (ORNL/TM-1999/44), Oak Ridge National Laboratory, Oak Ridge, Tennessee. 108 p.

Entrix Inc. 2002. City of Cle Elum Wastewater Treatment Plant Outfall Relocation and Hanson Ponds Habitat Restoration and Enhancement: Biological evaluation of potential impacts to threatened and endangered species and essential fish habitat. Prepared for City of Cle Elum, Washington. Prepared by Entrix, Inc, Olympia Washington. Project No. 396901, November 22, 2002. 96 pp. And four attachments.

Entrix Inc. 2003. City of Cle Elum Wastewater Treatment Plant Outfall Relocation and Hanson Ponds Habitat Restoration and Enhancement: Addendum to biological evaluation of potential impacts to threatened and endangered species and essential fish habitat. Prepared for City of Cle Elum, Cle Elum, Washington. Prepared by Entrix, Inc., Olympia, Washington. Project No. 3054805. August 1, 2003. 53 pp.

Federal Caucus. 2000. Conservation of Columbia basin fish: final basinwide salmon recovery strategy. <http://www.salmonrecovery.gov> December.

Gregory, R. S., and T. S. Northcote. 1993. Surface, planktonic, and benthic foraging by juvenile chinook salmon (*Oncorhynchus tshawytscha*) in turbid laboratory conditions. Can. J. Fish. Aquat. Sci. 50: 223-240.

Heede, B.H. 1986. Designing for dynamic equilibrium in streams. Water Resources Bulletin 22(3): 351-357.

Henjum, M.G. and seven others. 1994. Interim protection for late-successional forests, fisheries and watersheds. National Forests east of the Cascade crest, Oregon and Washington. A report to the United States Congress and the President. The Wildlife Society, Bethesda, MD.

Hilborn, R. 1992. Can fisheries agencies learn from experience? Fisheries 17: 6-14.

Hockersmith, E., J. Vella, and L. Stuehrenberg. 1995. Yakima River radio-telemetry study: steelhead, 1989-1993. Annual report submitted to Bonneville Power Administration, Portland, Oregon. DOE/BP-00276-3.

Howell, P., K. Jones, D. Scarnecchia, L. LaVoy, W. Knedra, and D. Orrmann. 1985. Stock assessment of Columbia River anadromous salmonids, 2 volumes. Final Report to

Bonneville Power Administration, Portland, Oregon (Project 83-335).

Independent Scientific Group. 1996. Return to the River: Restoration of Salmonid Fishes in the Columbia River Ecosystem. Northwest Power Planning Council. Portland, Oregon. 500 p.

Lee, D. C., J. R. Sedell, B. E. Rieman, R. F. Thurow, and J. E. Williams. 1997. Broadscale assessment of aquatic species and habitats. Volume III, Chapter 4. U.S. For. Serv., Gen. Tech. Rep. PNW-GTR-405. Portland, Oregon.

Lichatowich, J. A. and L. E. Mobrand. 1995. Analysis of Chinook salmon in the Columbia River from an ecosystem perspective. U.S. Department of Energy, Bonneville Power Administration, Portland, Oregon. 102 pp.

Lichatowich, J. A., L. Mobrand, L. Lestelle and T. Vogel. 1995. An approach to the diagnosis and treatment of depleted Pacific salmon populations in Pacific Northwest watersheds. Fisheries 20: 10-18.

Lilga, M.C. 1998. Effects of flow variation on stream temperatures in the lower Yakima river. Masters Thesis, Washington State University, Pullman, Washington. 91 pp.

Mackay, R.J. 1992. Colonization by lotic macroinvertebrates: a review of processes and patterns. Can. J. Aquat. Sci. 49: 617-628.

McClure, M.., E.E. Holmes, B. Sanderson, C.E. Jordan P. Kareiva and P. Levin. 2000. Revised Appendix B of Standardized Quantitative Analysis of the Risks Faced by Salmonids in the Columbia River Basin. NMFS, NWFSC, Seattle, WA September.

McIntosh, B.A., J.R. Sedell, J.E. Smith, R.C. Wissmar, S.E. Clarke, G.H. Reeves, and L.A. Brown. 1994. Management history of eastside ecosystems: Changes in fish habitat over 50 years, 1935 to 1992. USDA Forest Service, Pacific Northwest Research Station, General Technical Report PNW-GTR-321. February.

National Marine Fisheries Service (NMFS). 1996a. Factors for decline: a supplement to the notice of determination for West Coast steelhead under the Endangered Species Act. National Marine Fisheries Service, Protected Resources Branch, Portland, Oregon.

National Marine Fisheries Service (NMFS). 1996b. Making Endangered Species Act Determinations of Effect for Individual or Grouped Actions at the Watershed Scale. 31 p.

National Marine Fisheries Service (NMFS). 1999. The habitat approach. Implementation of section 7 of the Endangered Species Act for actions affecting the habitat of Pacific anadromous salmonids. Northwest Region, Habitat Conservation and Protected Resources Divisions, August 26.

National Marine Fisheries Service (NMFS). 2003. Endangered Species Act - Section 7 Consultation Biological Opinion And Magnuson-Stevens Fishery Conservation and

Management Act Essential Fish Habitat Consultation on Flood Control Measures at the Wapato Irrigation Project Main Diversion Dam on the Yakima River, Yakima County, WA WHB-2001/02046.

National Research Council Committee (NRCC). 1996. Upstream-Salmon and Society in the Pacific Northwest. National Academy Press, Washington, D.C.

Nehlsen, W., J.E. Williams and J.A. Lichatowich. 1991. Pacific salmon at the crossroads: Stocks at risk from California, Oregon, Idaho and Washington. Fisheries 16: 4-21.

Newcombe, C.P., and Jensen, J.O.T. 1996. Channel suspended sediment and fisheries: a synthesis for quantitative assessment of risk and impact. N. Am. J. Fish. Manag. 16: 693-727.

Omernik, J. M. 1987. Ecoregions of the conterminous United States. Annals of the Association of American Geographers 77: 118-125.

Pacific Fisheries Management Council. 1999. Amendment 14 to the Pacific Coast Salmon Plan. Appendix A: Description and Identification of Essential Fish Habitat, Adverse Impacts and Recommended Conservation Measures for Salmon. Pacific Fishery Management Council, Portland, Oregon.

Pearsons, T. N., G. A. McMichael, S. W. Martin, E. L. Bartrand, J. A. Long and S. A. Leider. 1996. Yakima species interactions studies. Annual Report FY 1994. Bonneville Power Administration DOE/BP-99852-3.

Phelps, S.R., B.M. Baker and C.A. Busack. 2000. Genetic relationships and stock structure of Yakima River basin and Klickitat River basin steelhead populations. Washington Department of Fish and Wildlife Genetics Unit unpublished report. Olympia, Washington. 56 pp.

Reichmuth, D. 2003. President of Geomax Professional Engineers, pers. comm.)

Reisenbichler, R. R., J. D. McIntyre, M. F. Solazzi, and S. W. Landino. 1992. Genetic variation in steelhead of Oregon and northern California. Transactions of the American Fisheries Society 121:158-162.

Renfrow, B. 2003. WDFW Area Habitat Biologist, personal communication, September 2003.

Rhodes, J.J., D.A. McCullough, and F.A. Espinosa, Jr. 1994. A coarse screening process for potential application in ESA consultations. Columbia River Intertribal Fish Commission. Prepared under NMFS/BIA Inter-Agency Agreement 40ABNF3. December.

Schreck, C. B. H. W. Li, R. C. Jhort, and C. S. Sharpe. 1986. Stock identification of Columbia River chinook salmon and steelhead trout. Final report to Bonneville Power Administration, Portland, Oregon (Project 83-451).

Sedell, J.R. and J.L. Froggatt. 1984. Importance of streamside forests to large rivers: the isolation of the Willamette River, Oregon, USA, from its floodplain by snagging and streamside forest removal. International Vereinigung fur theoretische und angewandte Limnologie Verhandlungen 22:1828-1834.

Servizi, J. A., and D. W. Martens. 1987. Some effects of suspended Fraser River sediments on sockeye salmon (*Oncorhynchus nerka*), p. 254-264. *In* H. D. Smith, L. Margolis, and C. C. Wood eds., Sockeye salmon (*Oncorhynchus nerka*) population biology and future management. Can. Spec. Publ. Fish. Aquat. Sci. 96.

Servizi, J. A., and D. W. Martens. 1992. Sublethal responses of coho salmon (*Oncorhynchus kisutch*) to suspended sediments. Can. J. Fish. Aquat. Sci. 49: 1389-1395.

Shaw, E.A. and J.S. Richardson. 2001. Direct and indirect effects of sediment pulse duration on stream invertebrate assemblages and rainbow trout (*Oncorhynchus mykiss*) growth and survival. Canadian Journal of Fisheries and Aquatic Sciences 58: 2213-2221.

Sheldon and Associates. 2003. Yakama Nation Hanson Ponds Habitat Restoration/Enhancement: Revised Wetland Delineation and Impact Assessment Report.

Sigler, J. W., T.C. Bjornn, and F. H. Everest. 1984. Effects of chronic turbidity on density and growth of steelhead and coho salmon. Trans. Am. Fish. Soc. 113: 142-150.

Simons, D.B. and E.V. Richardson. 1966. Resistance to flow in alluvial channels. U.S. Geological Survey Professional Paper 422-J. USGS, Reston, VA.

Spence, B.C, G.A. Lomnicky, R.M. Hughes, R.P. Novitzki. 1996. An Ecosystem Approach to Salmonid Conservation. TR-4501-96-6057. ManTech Environmental Research Services Corp., Corvallis, OR.

Stanford, J. A. and J. V. Ward. 1993. An ecosystem perspective of alluvial rivers: connectivity and the hyporheic corridor. J. N. Am. Benthol. Soc. 12(1): 48-60.

Tuck, R. L. 1995. Impacts of irrigation development on anadromous fish in the Yakima River Basin, Washington. Masters Thesis, Central Washington University, Ellensburg, Washington. 246 pp.

Vaccaro, J.J. 1986. Simulation of streamflow temperatures in the Yakima river basin, Washington, April-October 1981. U.S. Geological Survey Water Resources Investigations Report 85-4232, Tacoma, Washington.

Waples, R. S. 1991. Pacific salmon, *Oncorhynchus* spp., and the definition of “species” under the Endangered Species Act. Mar. Fish. Rev. 53: 11-22.

Washington Department of Ecology (WDOE). 1998. The 303(d) List of Impaired and Threatened Waterbodies 1998 List - by Water Resource Inventory Areas (WRIAs).

http://www.ecy.wa.gov/programs/wq/303d/1998/1998_by_wrias.html

Washington Department of Ecology (WDOE). 2003. River and stream water quality monitoring. http://www.ecy.wa.gov/programs/eap/fw_riv/rv_main.html (Site checked on 10/1/03).

Washington Department of Fisheries and Washington Department of Wildlife (WDF). 1993. Washington State Salmon and Steelhead Stock Inventory. Appendix Three; Columbia River Stocks. Washington Department of Fisheries, Olympia, Washington.

Waters, T.F. 1995. Sediment in streams: Sources, biological effects and controls. American Fisheries Society Monograph 7, Bethesda, Maryland.

Wissmar, R.C., J.E. Smith, B.A. McIntosh, H.W. Li, G.H. Reeves, and J.R. Sedell. 1994. Ecological health of river basins in forested regions of eastern Washington and Oregon. Gen. Tech. Rep. PNW-GTR-326. U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. Portland, OR. 65 p.

Yakima Subbasin Summary (YSS). 2001. Prepared for the Northwest Power Planning Council, Portland, OR. Laura Berg, Editor. 376 pp.

5.0 APPENDIX A